

Aeschynomeneae (14.01–14.26)

Genus: *Ormocarpum* A.M.F.J. Palisot de Beauvois

Phylogenetic Number: 14.01.

Tribe: Aeschynomeneae.

Subtribe: Ormocarpinae.

Species Studied—Species in Genus: 12 spp.—ca. 20 spp.

Fruit a legume or loment; unilocular; $3.5\text{--}6 \times 0.5\text{--}0.8 \times 0.2\text{--}0.3$ cm; with persistent (*O. kirkii* S. le M. Moore) or deciduous corolla; with persistent (*O. kirkii*) or deciduous calyx; with calyx shorter than fruit; with or without orifice formed by curving of fruit or fruit segments (*O. kirkii*); straight to curved to 1-coiled (*O. kirkii*); not plicate; not twisted; asymmetrical or symmetrical; moniliform, C-shaped, or coiled; when asymmetrical with 1 straight and 1 curved suture or both sutures parallelly curved; widest near middle or D-shaped; not inflated; flattened; without or with beak; straight; with solid beak the same color and texture as fruit; long tapered, short tapered, or rounded at apex; apex aligned to oblique with longitudinal axis of fruit; long or short tapered at base; base aligned to oblique with longitudinal axis of fruit; with the apex and base uniform in texture; coriaceous; seed chambers externally visible; with the raised seed chambers not torulose. Fruit margin constricted along both margins; without sulcus; plain. Fruit wings absent. Fruit stipitate to substipitate; with the stipe 3–8 mm long. Fruit indehiscent. Replum invisible. Loment indehiscent. Loment segments (articles) inconspicuous; 6–20 mm long; widest across seed area; with upper 1 or lower 1 different shape than middle ones; oblong or D-shaped. Epicarp dull; monochrome; dark green; glabrous or pubescent and indurate; with 1 type of pubescence; puberulent; with pubescence yellow; with pubescence uniformly distributed; with simple hairs (often with swollen bases); stiff; with hair bases swollen; retrorse; straight at apex; glandular; with glandular hairs (minutely tubercule bases); with spines; not smooth; with elevated features; longitudinally veined relative to fruit length or reticulately veined; tuberculate or not tuberculate; with solid tubercles on each valve; tuberculate; not exfoliating; without cracks. Mesocarp thick; surface not veined; 1-layered; without balsamic vesicles; without fibers; solid; coriaceous. Endocarp nearly glossy; monochrome; brown; smooth; septate or nonseptate; with septa thicker than paper, firm; with the septa eglandular;

chartaceous; not exfoliating; remaining fused to epicarp; entire. Seeds 1–6; length parallel with fruit length; neither overlapping nor touching; in 1 series. Funiculus less than 0.5 mm long; of 1 length only; thick; straight or curved. Aril absent.

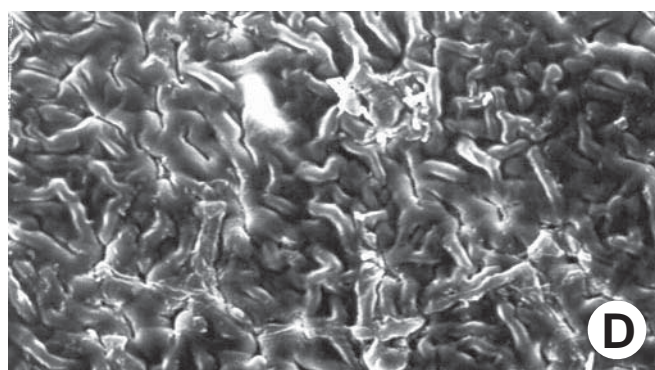
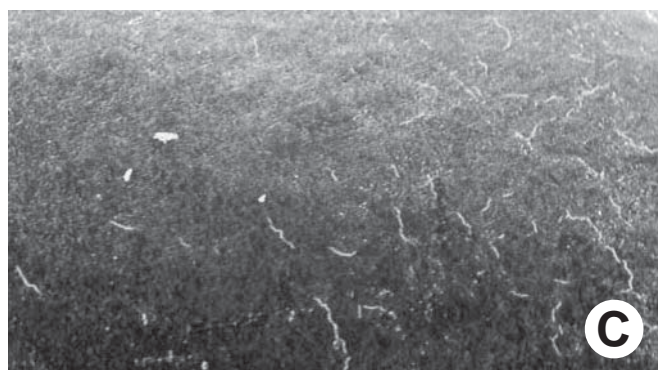
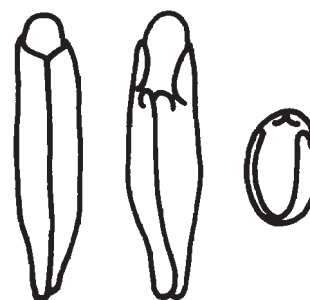
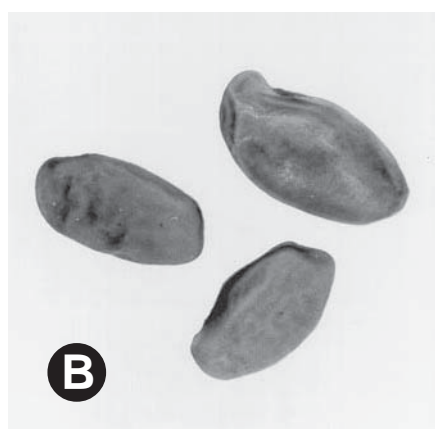
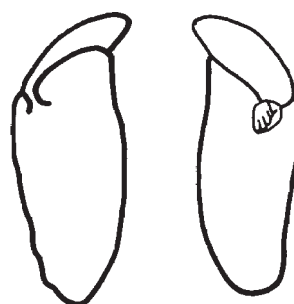
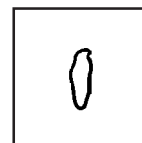
Seed $2\text{--}9 \times 1.5\text{--}4 \times 1.2\text{--}2$ mm; not overgrown; not angular; asymmetrical; circular to elliptic to oblong; compressed to flattened; with visible radicle and cotyledon lobes; with external groove between radicle and cotyledon lobes; same color as testa; without umbo on seed faces. Testa not adhering to endocarp; dull; colored; monochrome; pinkish to reddish brown or tan; glabrous; smooth; chartaceous. Fracture lines absent. Rim absent. Wings absent. Raphe from hilum to near base of seed and terminating (from hilum to nearly base of seed); not bifurcating; darker than testa; brown; flush. Hilum fully concealed; concealed by funicular remnant; without faboid split; larger than punctiform; 1–1.3 mm long; with curved outline; elliptic; between cotyledon and radicle lobe; flush; within halo. Hilum halo color of or darker than testa. Lens not discernible. Endosperm trace; $1/2$ covering entire embryo; adnate to testa. Cotyledons smooth; both outer faces convex; both the same thickness; both more or less of equal length; not folded; margin entire 180 degrees from base of radicle; similar at apex; partially concealing radicle; split over radicle; with lobes; with lobes not touching; with the interface division terminating at base of radicle; without margins recessed; reddish tan; inner face flat; glabrous around base of radicle. Embryonic axis deflexed; oblique to length of seed. Radicle linear; oblique to cotyledons; centered between cotyledons; less than $1/2$ length of cotyledons. Plumule well developed; glabrous.

Distribution: Tropical and South Africa, Madagascar, southern Asia to Philippines, and Fiji.

Notes: Rudd (1981a) recognized four subtribes of Aeschynomeneae: Ormocarpinae Rudd (genera 14.01–14.08), Aeschynomeninae (genera 14.09–14.16), Discolobiinae (Burkart) Rudd (genus 14.17: *Discolobium*), Poiratiinae (Burkart) Rudd (genera 14.18–14.21), and Stylosanthinae (Benth) Rudd (genera 14.22–14.26). Tribal and subtribal placement of *Diphyssa* is based on Lavin (1987) and Polhill (1994a, 1994b) and not on Polhill and Sousa (1981), who placed *Diphyssa* in Robinieae. Because Lavin did not relate *Diphyssa* to a genus in subtribe Ormocarpinae, we have assigned the genus the phylogenetic number 14.03. Bailey et al. (1997), using the chloroplast *rpl2*

intron and ORF184, suggested that *Brya* (11.01), *Cranocarpus* (11.02), *Phylacium* (11.22), and *Neocollettia* (11.26) are not members of Desmodieae (11) and that they probably belong in Aeschynomeneae. Gillett (1966b) described the 17 species of *Ormocarpum* from southwestern Asia and Africa (excluding Madagascar) and presented some fruit and seed data and some fruit illustrations.

Ormocarpum: *O. orientale* (C.P.J. Sprengel) E.D. Merrill
(*C-E*), *O. spp.* (*A-B*). *A*, Article and partial fruit,
without or with calyx ($\times 1.8$); *B*, seeds ($\times 4$); *C-D*,
testa ($\times 50$, $\times 1000$); *E*, embryos ($\times 5$).



Genus: *Ormocarpopsis* R. Viguier

Phylogenetic Number: 14.02.

Tribe: Aeschynomeneae.

Subtribe: Ormocarpinae.

Species Studied—Species in Genus: 1 sp.—5 spp.

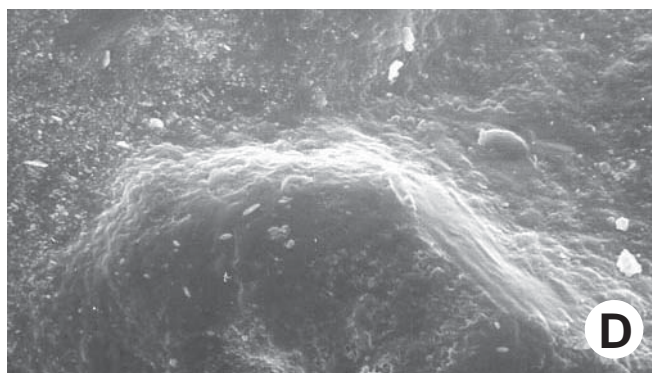
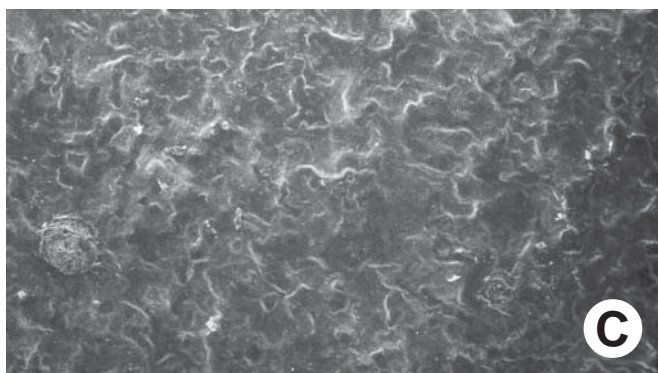
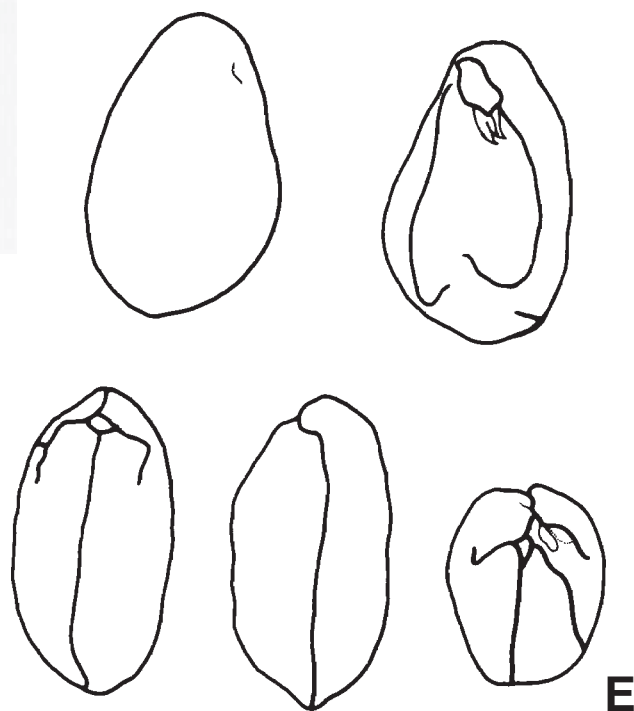
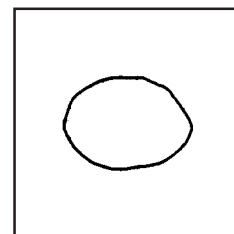
Fruit a legume; unilocular; $2.3\text{--}3 \times 1.3\text{--}2 \times 1.3\text{--}2$ cm; with deciduous corolla; with deciduous calyx; without orifice formed by curving of fruit or fruit segments; straight; not plicate; not twisted; asymmetrical; oblong; when asymmetrical with both sutures parallelly curved; not inflated; terete; with beak; straight; with the apex and base uniform in texture; seed chambers externally invisible. Fruit margin not constricted; without sulcus; embellished. Fruit wings absent. Fruit stipitate or substipitate; with the stipe up to 8 mm long. Fruit indehiscent. Replum invisible. Fruit a nutlet; entire. Epicarp dull; monochrome; greenish brown; glabrous; glandular; with spines (glandular) or without spines; not smooth; with elevated features; not veined; tuberculate or not tuberculate; with solid tubercles on each valve (minute); warty (bases of spines); not exfoliating; without cracks. Mesocarp present (and streaked with purple); thin; surface not veined; 1-layered; without balsamic vesicles; without fibers; solid; coriaceous. Endocarp dull; monochrome; tan; smooth; nonseptate; chartaceous; exfoliating; separating from mesocarp. Seed 1; length parallel with fruit length. Funiculus less than 0.5 mm long; thick; straight. Aril absent.

Seed $18 \times 13 \times 10$ mm; overgrown, 1 seed filling entire fruit cavity; not angular; asymmetrical; ovate; terete; with surface smooth; without visible radicle and cotyledon lobes; without hilar sinus; without umbo on seed faces. Testa not adhering to endocarp; dull; not modified by a bloom; colored; monochrome; reddish brown; glabrous; not smooth; with elevated features; shagreen; coriaceous. Fracture lines absent. Rim absent. Wings absent. Raphe not visible. Hilum visible; without faboid split; larger than punctiform; 1.5 mm long; with straight outline; linear; marginal according to radicle tip; flush; not within corona, halo, or rim. Lens discernible; equal to or greater than 0.5 mm in length; 2.5 mm long; with margins straight or curved; oblong; not in groove of raphe; confluent with hilum; mounded; similar color as testa; darker than testa; reddish brown; not within corona, halo, or rim. Endosperm absent. Cotyledons not smooth or smooth; wrinkled or

wrinkled and 1–3 grooves on each face; both outer faces convex; both the same thickness; both more or less of equal length; not folded; margin not entire 180 degrees from base of radicle; notched or notched and bearing flaps; similar at apex; completely concealing radicle; split over radicle; with lobes; with lobes touching (auriculate) or not touching; with basal groin formed by lobes; with the interface division terminating at base of radicle; without margins recessed; brown; inner face concave (in center with varying width rim around the depression); glabrous around base of radicle. Embryonic axis straight; parallel to oblique to length of seed; with a joint evident between the radicle and the cotyledons. Radicle differentiated from cotyledon; triangular; lobe tip straight; straight with embryonic axis; centered between cotyledons; less than 1/2 length of cotyledons. Plumule well developed; pubescent at the base and glabrous at the apex.

Distribution: Madagascar.

Ormocarpopsis: *O. aspera* R. Viguier (A–E). A, Fruit ($\times 2.1$); B, seed ($\times 2.3$); C–D, testa ($\times 50$, $\times 1000$); E, embryos ($\times 2.5$).



Genus: *Diphysa* N. von Jacquin

Phylogenetic Number: 14.03.

Tribe: Aeschynomeneae.

Subtribe: Ormocarpinae.

Species Studied—Species in Genus: 8 spp.—15 spp. or 20 spp.

Fruit a legume; unilocular; $3\text{--}6.5 \times 0.7\text{--}3 \times 0.7\text{--}3$ (estimated) cm; with deciduous corolla; with persistent calyx; with calyx shorter than fruit; without orifice formed by curving of fruit or fruit segments; straight; not plicate; not twisted; symmetrical; linear or oblong; inflated; terete; without beak; short tapered to rounded at apex; apex aligned with longitudinal axis of fruit; long tapered or rounded at base; base aligned with longitudinal axis of fruit; with the apex and base uniform in texture; membranous; seed chambers externally invisible. Fruit margin not constricted; without sulcus; plain or embellished; with wing. Fruit wing present or absent; 1; sutural (subwinged or keeled); on 1 suture. Fruit stipitate to substipitate; with the stipe up to 15 mm long. Fruit indehiscent. Replum invisible. Epicarp dull; monochrome; brown or tan; glabrous; without spines; not smooth; with elevated features; longitudinally veined relative to fruit length (with faint cross veining) or reticulately veined; not tuberculate; not exfoliating; with to without cracks; cracking irregular. Mesocarp absent. Endocarp dull; monochrome; tan; scurfy; nonseptate; coriaceous; not exfoliating; remaining fused to epicarp; entire. Seeds few, probably less than 5; length oblique to fruit length; neither overlapping nor touching; in 1 series. Funiculus less than 0.5 mm long; of 1 length only; filiform; straight. Aril absent.

Seed $4\text{--}7 \times 2.7\text{--}4.5 \times 1.5\text{--}3.3$ mm; not overgrown; not angular; asymmetrical; oblong; terete to compressed; with or without visible radicle and cotyledon lobes; with external groove between radicle and cotyledon lobes; same color as testa; without umbo on seed faces. Testa not adhering to endocarp; dull; modified by a bloom; colored; monochrome; dark reddish brown to tan; glabrous; smooth; coriaceous. Fracture lines absent. Rim absent. Raphe from hilum to near base of seed and terminating; not bifurcating; color of testa; raised to recessed. Hilum visible to partially concealed; concealed by funicular remnant; with faboid split; with the lips of the faboid split the same color as the rest of the

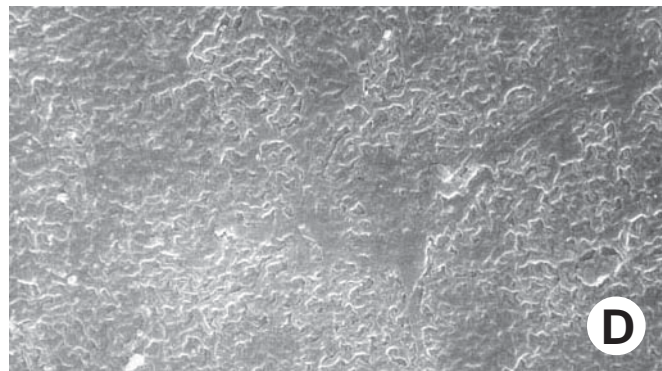
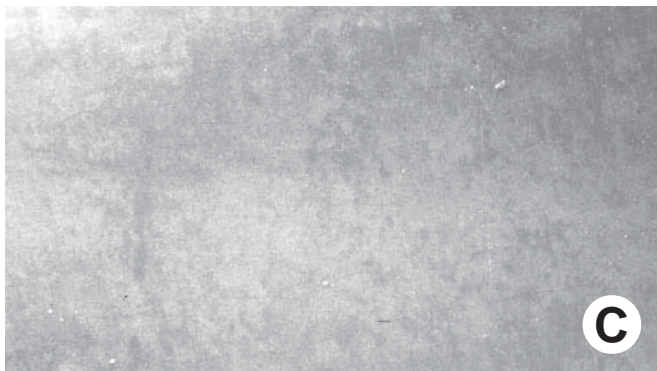
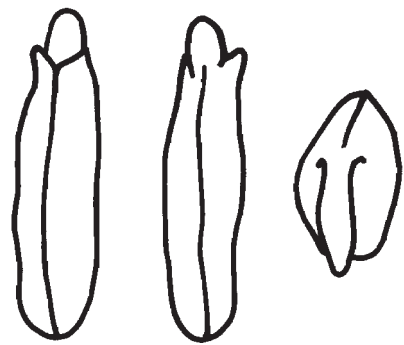
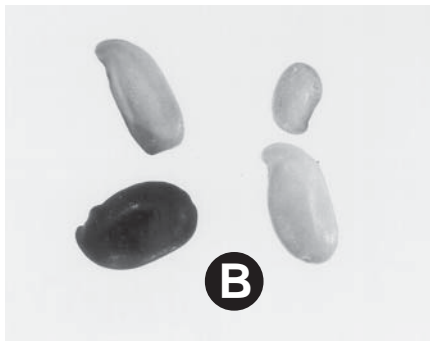
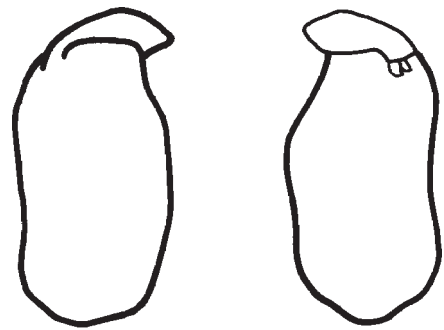
hilum; punctiform to larger than punctiform; up to 0.5 mm long; with curved outline; circular; subapical to radicle tip or between cotyledon and radicle lobe; recessed; within rim or not within corona, halo, or rim. Hilum rim color of testa. Lens not discernible. Endosperm thick to thin; covering entire embryo; adnate to testa. Cotyledons smooth; both outer faces convex; both the same thickness; both more or less of equal length; not folded; margin entire 180 degrees from base of radicle; similar at apex; partially concealing radicle; split over radicle; with lobes; with lobes not touching; with the interface division terminating at base of radicle; without margins recessed; yellow or green (ish); inner face flat; glabrous around base of radicle. Embryonic axis right angled; perpendicular to length of seed. Radicle linear; lobe tip straight; deflexed and parallel to cotyledon width; centered between cotyledons; less than 1/2 length of cotyledons. Plumule moderately developed to well developed; glabrous.

Distribution: Mexico, Central America, northern South America.

Notes: Tribal and subtribal placement of *Diphysa* is based on Lavin (1987, Polhill 1994a,b), and not on Polhill and Sousa (1981), who placed *Diphysa* in Robinieae.

Diphysa: *D. minutifolia* J.N. Rose (*E*), *D. robinoides* G. Benth (C–D), *D. spp.* (A–B). A, Fruits ($\times 0.9$); B, seeds ($\times 2.4$); C–D, testa ($\times 50$, $\times 1000$); E, embryos ($\times 6$).

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Genus: *Belairia* A. Richard

Phylogenetic Number: 14.04.

Tribe: Aeschynomeneae.

Subtribe: Ormocarpinae.

Species Studied—Species in Genus: 1 sp.—5–6 spp.

Fruit a legume; unilocular; $1.5\text{--}2 \times 0.4\text{--}0.5 \times 0.03$ cm; with deciduous corolla; with deciduous calyx; without orifice formed by curving of fruit or fruit segments; straight; not plicate; not twisted; symmetrical; linear or oblong; not inflated; flattened; without or with beak; with solid beak the same color and texture as fruit; short tapered to rounded at apex; apex aligned with longitudinal axis of fruit; short tapered at base; base aligned with longitudinal axis of fruit; with the apex and base uniform in texture; coriaceous; seed chambers externally invisible. Fruit margin not constricted; without sulcus; plain. Fruit wings absent. Fruit substipitate. Fruit indehiscent. Replum invisible. Epicarp dull; monochrome; brown; glabrous; eglandular; without spines; not smooth; with elevated features; longitudinally veined relative to fruit length or reticulately veined; not tuberculate; not exfoliating; without cracks. Mesocarp thin; surface not veined; 1-layered; without balsamic vesicles; without fibers; spongy; coriaceous. Endocarp dull; monochrome; brown; smooth; nonseptate; chartaceous; not exfoliating; remaining fused to epicarp; entire. Seeds 2; length parallel with fruit length; neither overlapping nor touching; in 1 series. Funiculus less than 0.5 mm long; of 1 length only; thick; straight. Aril absent.

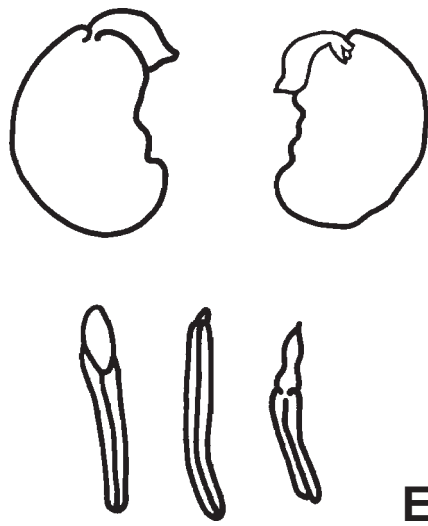
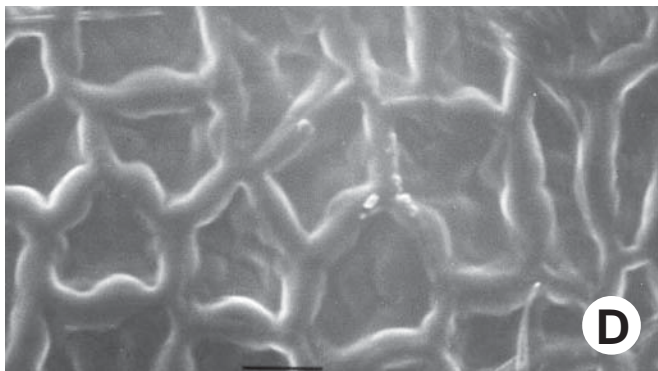
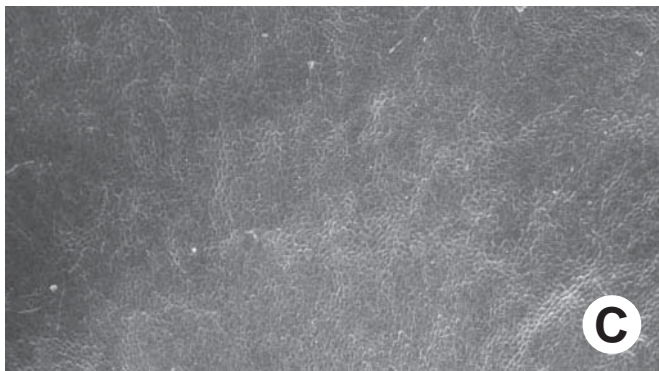
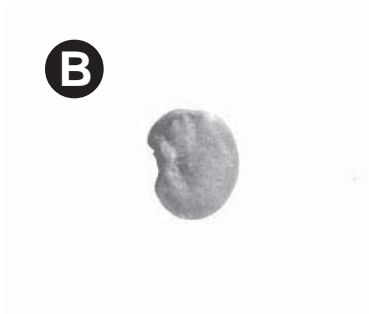
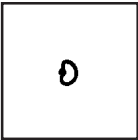
Seed $3.5\text{--}3.7 \times 2.5\text{--}2.7 \times 0.6$ mm; not overgrown; not angular; asymmetrical; circular (with radicle lobe); flattened; with visible radicle and cotyledon lobes; without umbo on seed faces. Testa not adhering to endocarp; dull; not modified by a bloom; colored; monochrome; tan; smooth; chartaceous. Fracture lines absent. Rim absent. Raphe not visible. Hilum fully concealed; concealed by funicular remnant; without faboid split; punctiform; marginal according to radicle tip; flush (and dark brown). Lens not discernible. Endosperm absent. Cotyledons smooth; both outer faces convex; both the same thickness; both more or less of equal length; not folded; margin entire 180 degrees from base of radicle; similar at apex; not concealing radicle; split over radicle; with lobes; with lobes not touching; with the interface division terminat-

ing at base of radicle; without margins recessed; tan; inner face flat; glabrous around base of radicle. Embryonic axis deflexed; oblique to length of seed. Radicle bulbous; lobe tip straight; deflexed and parallel to cotyledon length or width; centered between cotyledons; less than 1/2 length of cotyledons. Plumule well developed; glabrous.

Distribution: Cuba.

Notes: Data from the meager (at the U.S. National Seed Herbarium [BARC]) samples were supplemented by fruit notes and illustrations in Lewis (1988). The number of species in the genus is based on Lewis, not on Rudd (1981a).

Belairia: *B. mucronata* A.H.R. Grisebach (A–E). A, Fruits ($\times 3.2$); B, seed ($\times 4.5$); C–D, testa ($\times 50$, $\times 1000$); E, embryos ($\times 10$).



E

Genus: *Pictetia* A.-P. de Candolle

Phylogenetic Number: 14.05.

Tribe: Aeschynomeneae.

Subtribe: Ormocarpinae.

Species Studied—Species in Genus: 4 spp.—ca. 6 spp.

Fruit a legume or loment; unilocular; $2.5\text{--}4 \times 0.5\text{--}1 \times 0.09\text{--}0.2$ cm; with deciduous corolla; with persistent or deciduous calyx; with calyx shorter than fruit; without orifice formed by curving of fruit or fruit segments; straight to curved (to slightly curved); not plicate; not twisted; asymmetrical or symmetrical; broadly linear to oblong; when asymmetrical with both sutures parallelly curved; not inflated; flattened to compressed; without beak; short tapered to rounded at apex; apex aligned with longitudinal axis of fruit; short tapered to rounded at base; base aligned with longitudinal axis of fruit; with the apex and base uniform in texture; coriaceous; seed chambers externally visible or invisible; with the raised seed chambers not torulose. Fruit margin constricted or not constricted; constricted along both margins; without sulcus; plain. Fruit wings absent. Fruit substipitate to nonstipitate. Fruit indehiscent. Replum invisible. Loment indehiscent. Loment segments (articles) inconspicuous; 7–10 mm long; widest across seed area; with all essentially similar in shape; oblong. Epicarp dull to glossy; monochrome; brown; pubescent and indurate; with 1 type of pubescence; puberulent; with pubescence gray; pliable; with hair bases plain; eglandular; without spines; not smooth; with elevated features; reticulately veined; tuberculate or not tuberculate; with solid tubercles on each valve; tuberculate; not exfoliating; without cracks. Mesocarp thin; surface not veined; 1-layered; without balsamic vesicles; without fibers; mealy; chartaceous. Endocarp dull; monochrome; tan; smooth; septate or nonseptate; with septa thicker than paper, firm; with the septa eglandular; coriaceous; not exfoliating; remaining fused to epicarp; entire. Seeds 1–5; length parallel with fruit length; neither overlapping nor touching; in 1 series. Funiculus less than 0.5 mm long; of 1 length only; thick; contorted. Aril dry; rim-aril; tan.

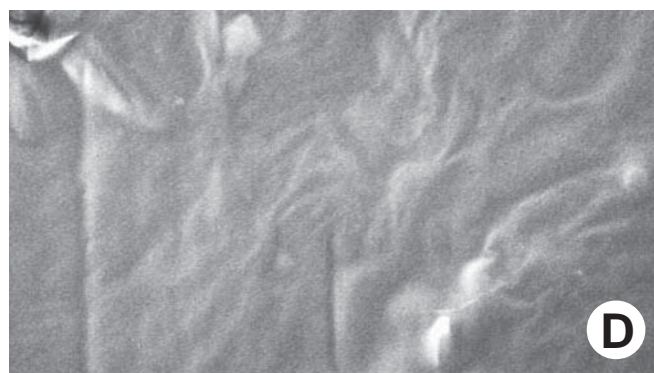
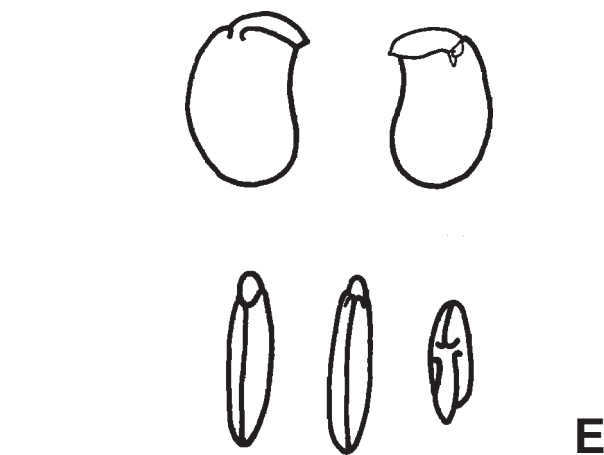
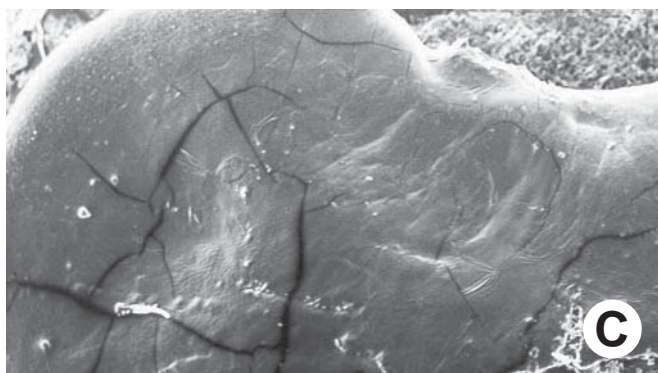
Seed $5\text{--}5.3 \times 3\text{--}3.2 \times 0.3\text{--}0.4$ mm; not overgrown; not angular; asymmetrical; C-shaped; flattened; with visible radicle and cotyledon lobes (barely); without umbo on seed faces. Testa not adhering to endocarp; glossy; not modified by a bloom; colored; monochrome; tan;

glabrous; smooth; coriaceous. Fracture lines absent. Rim absent. Raphe not visible. Hilum fully concealed; concealed by aril; without faboid split (visible); punctiform; between cotyledon and radicle lobe; flush; not within corona, halo, or rim. Lens discernible; less than 0.5 mm in length; with margins straight or curved; oblong; not in groove of raphe; 180 degrees from hilum; flush; dissimilar color from testa; darker than testa; black (ish); not within corona, halo, or rim. Endosperm thin; $1/2$ covering entire embryo; adnate to testa. Cotyledons smooth; both outer faces convex; both the same thickness; both more or less of equal length; not folded; margin entire 180 degrees from base of radicle; similar at apex; partially concealing radicle; split over radicle; with lobes; with lobes not touching; with the interface division terminating at base of radicle; without margins recessed; white; inner face flat; glabrous around base of radicle. Embryonic axis deflexed; oblique to length of seed. Radicle linear; lobe tip straight; deflexed and parallel to cotyledon width; centered between cotyledons; less than $1/2$ length of cotyledons. Plumule moderately developed; glabrous.

Distribution: West Indies.

Pictetia: *P. spinifolia* (A.N. Desvoux) I. Urban (*B–E*), *P.* spp. (*A*). *A*, Fruit and partial fruit ($\times 2.6$); *B*, seeds ($\times 5.3$); *C–D*, testa ($\times 50$, $\times 1000$); *E*, embryos ($\times 5$).

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Genus: *Fiebrigiella* H.A.T. Harms

Phylogenetic Number: 14.06.

Tribe: Aeschynomeneae.

Subtribe: Ormocarpinae.

Species Studied—Species in Genus: 1 sp.—1 sp.

Fruit a loment; $3\text{--}3.1 \times 0.3\text{--}0.4 \times 0.08\text{--}0.1$ cm; with deciduous corolla; with persistent or deciduous calyx; with calyx shorter than fruit; without orifice formed by curving of fruit or fruit segments; straight to curved (slightly); not plicate; not twisted; asymmetrical; when asymmetrical with 1 straight and 1 curved suture; narrowing in several places, resembling *Desmodium* fruit; not inflated; flattened; without beak; short tapered at apex; apex aligned to oblique with longitudinal axis of fruit; tapered to short tapered at base; base aligned with longitudinal axis of fruit; with the apex and base uniform in texture; coriaceous; seed chambers externally visible; with the raised seed chambers not torulose. Fruit margin constricted only on 1 margin; without sulcus; plain. Fruit wings absent. Fruit substipitate. Fruit indehiscent. Replum invisible. Loment indehiscent. Loment segments (articles) inconspicuous; 5–6 mm long; widest across seed area; with all essentially similar in shape; D-shaped. Epicarp dull; monochrome; dirty brown; pubescent but soon deciduous; with 1 type of pubescence; puberulent; with pubescence golden; with pubescence uniformly distributed; with simple hairs; pliable; with hair bases plain; eglandular; without spines; not smooth; with elevated features; reticulately veined (with 1 major vein and 1 minor longitudinal vein); not tuberculate; not exfoliating; without cracks. Mesocarp thin; surface not veined; 1-layered; without balsamic vesicles; without fibers; solid; coriaceous. Endocarp glossy; monochrome; tan; spongy; septate; with septa thicker than paper, firm; chartaceous; not exfoliating; remaining fused to epicarp; entire. Seeds 2–4; length parallel with fruit length; neither overlapping nor touching; in 1 series. Funiculus less than 0.5 mm long; of 1 length only; thick; straight. Aril dry; rim-aril; reddish brown.

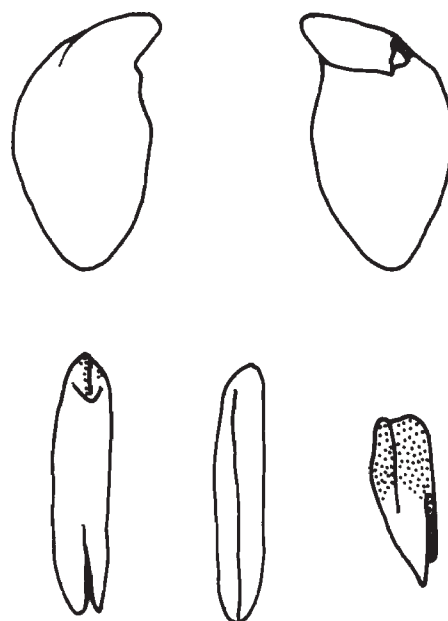
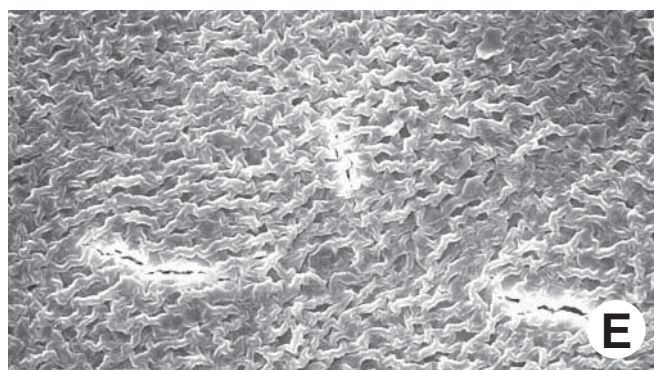
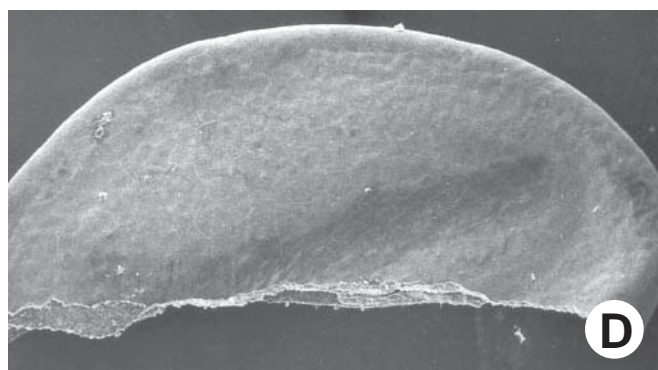
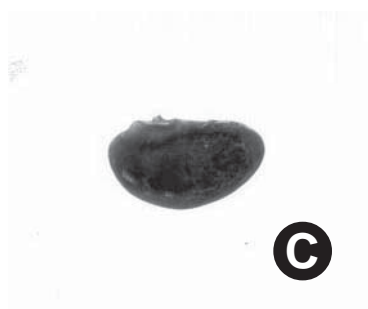
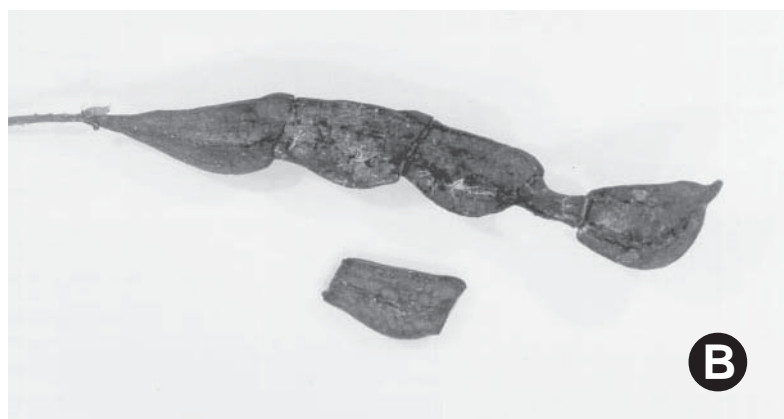
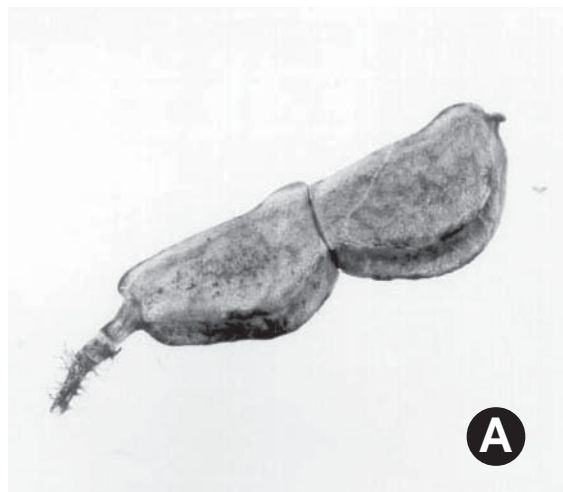
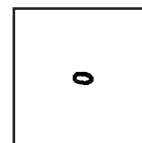
Seed $4.2\text{--}5 \times 2.5\text{--}3 \times 0.7\text{--}1$ mm; not overgrown; not angular; asymmetrical; D-shaped; flattened; without visible radicle and cotyledon lobes; without umbo on seed faces. Testa not adhering to endocarp; dull; not modified by a bloom; colored; monochrome; reddish

brown; glabrous; smooth or not smooth; with elevated features; wrinkled (1 longitudinal wrinkle); chartaceous. Fracture lines absent. Rim absent. Wings absent. Raphe not visible. Hilum partially concealed; concealed by aril (rim); without faboid split; punctiform; marginal according to radicle tip; flush; not within corona, halo, or rim. Lens discernible; less than 0.5 mm in length; with margins curved; circular; not in groove of raphe; adjacent to hilum; 1 mm from hilum; mounded; dissimilar color from testa; darker than testa; black (ish); not within corona, halo, or rim. Endosperm absent. Cotyledons smooth; both outer faces convex; both the same thickness; both more or less of equal length; not folded; margin entire 180 degrees from base of radicle; similar at apex; not concealing radicle; split over radicle; with lobes; with lobes not touching; without basal groin formed by lobes; with the interface division terminating at base of radicle; without margins recessed; brown; inner face flat; glabrous around base of radicle. Embryonic axis straight; oblique to length of seed; without a joint evident between the radicle and the cotyledons. Radicle differentiated from cotyledon; bulbous; lobe tip straight; oblique to cotyledons; centered between cotyledons; less than 1/2 length of cotyledons. Plumule rudimentary; glabrous.

Distribution: Bolivia.

Notes: Burkart and Vilchez (1971) monographed the genus, and their figure 2 was consulted in preparing our plate. Scant seeds and fruits were available for our study.

Fiebrigiella: *F. gracilis* H.A.T. Harms (A–F). A, Fruit ($\times 5.9$); B, fruit and article ($\times 3$); C, seed ($\times 8$); D–E, testa ($\times 50$, $\times 1000$); F, embryos ($\times 8$).



F

Genus: *Chaetocalyx* A.-P. de Candolle

Phylogenetic Number: 14.07.

Tribe: Aeschynomeneae.

Subtribe: Ormocarpinae.

Species Studied—Species in Genus: 10 spp.—12 spp.

Fruit a loment; $7\text{--}16 \times 0.2\text{--}2.2 \times 0.07\text{--}0.2$ cm; with deciduous corolla; with persistent or deciduous calyx; with calyx shorter than fruit; without orifice formed by curving of fruit or fruit segments; straight, curved (or slightly curved), or S-curved; not plicate; not twisted; asymmetrical or symmetrical; linear; when asymmetrical with both sutures parallelly curved; not inflated; flattened or compressed; without beak; tapered or short tapered at apex; apex aligned or oblique with longitudinal axis of fruit; short tapered or rounded at base; base aligned with longitudinal axis of fruit; with the apex and base uniform in texture; membranous; seed chambers externally invisible. Fruit margin not constricted; without sulcus; plain or embellished; with wing. Fruit wing 1; 8–10 mm wide; continuous wing around fruit. Fruit stipitate, substipitate, or nonstipitate; with the stipe 5–15 mm long. Fruit indehiscent. Replum invisible. Loment indehiscent. Loment segments (articles) inconspicuous; 4–17 mm long; widest across seed area; with upper 1 different shape than middle ones; oblong or quadrangular. Epicarp dull; monochrome or multicolored; bichrome (flattened fruit have a darker center (over seed chambers) that fades to lighter margins); brown or tan; glabrous, glabrate, or pubescent and indurate; with 1 type of pubescence; velutinous; with pubescence gray; with pubescence uniformly distributed; with simple hairs; pliable; with hair bases plain; glandular; with glandular setae (few); without spines; not smooth; with elevated features; reticulately veined; not tuberculate; not exfoliating; without cracks. Mesocarp thick; surface not veined; 1-layered; without balsamic vesicles; without fibers; solid; ligneous (sub). Endocarp dull; monochrome; gray; cobwebby; septate; with septa thicker than paper, firm; with the septa eglandular; coriaceous; not exfoliating; remaining fused to epicarp; entire. Seeds 6–16; length parallel with fruit length; neither overlapping nor touching; in 1 series. Funiculus less than 0.5 mm long; of 1 length only; straight. Aril absent.

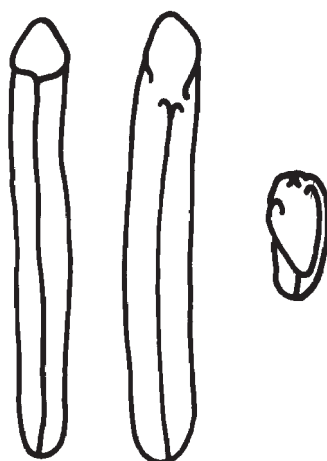
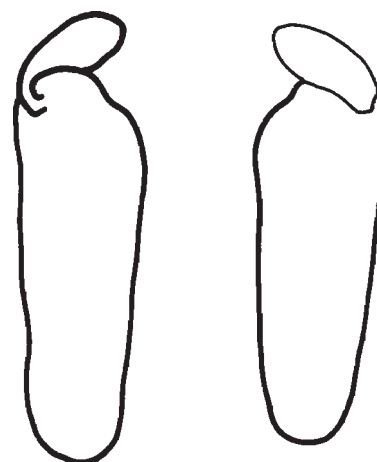
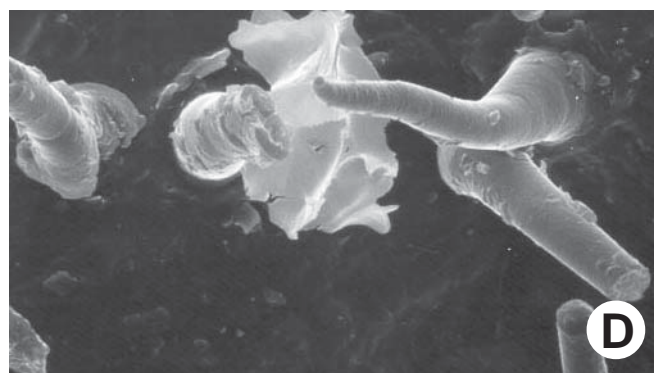
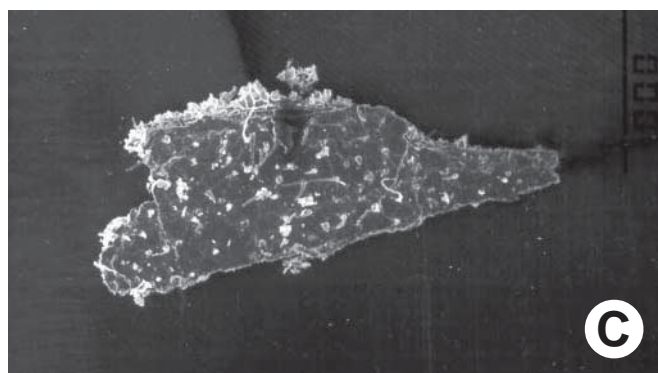
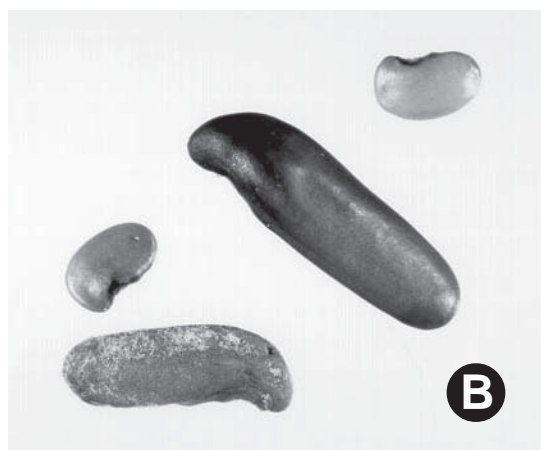
Seed $2.5\text{--}7 \times 2\text{--}2.5 \times 2\text{--}2.5$ mm; not overgrown; not angular; asymmetrical; linear or reniform; terete; with

visible radicle and cotyledon lobes; without umbo on seed faces. Testa not adhering to partially adhering to endocarp; glossy; not modified by a bloom; colored; monochrome; reddish brown; glabrous; smooth; coriaceous. Fracture lines absent. Rim absent. Raphe not visible. Hilum visible; with faboid split; with the lips of the faboid split the same color as the rest of the hilum; punctiform or larger than punctiform; 0.3 mm long; with curved outline; circular; between cotyledon and radicle lobe; flush; within rim. Hilum rim color darker than testa (slightly). Lens discernible; less than 0.5 mm in length (ca. 0.3 mm); with margins curved; circular; not in groove of raphe; adjacent to hilum; 0.1 mm from hilum; mounded; similar color as testa; darker than testa; brown; not within corona, halo, or rim. Endosperm thick; 1/2 covering entire embryo; adnate to testa. Cotyledons smooth; both outer faces convex; both the same thickness; both more or less of equal length; not folded; margin entire 180 degrees from base of radicle; similar at apex; not concealing radicle; entire over radicle; without lobes; with the interface division terminating at base of radicle; without margins recessed; yellow; inner face flat; glabrous around base of radicle. Embryonic axis deflexed; oblique to length of seed. Radicle bulbous; lobe tip curved; deflexed and parallel to cotyledon width; centered between cotyledons; less than 1/2 length of cotyledons. Plumule rudimentary; glabrous.

Distribution: Tropical America.

Notes: Rudd (1958) monographed the genus and Diatloff and Diatloff (1977) noted that *Chaetocalyx* is a non-nodulating faboid legume genus.

Chaetocalyx: *C. brasiliensis* (J.R.T. Vogel) G. Benth. (*E*), *C. latisiliqua* (J.L.M. Poiret) G. Benth. ex W.B. Hemsley (*C–D*), *C. spp.* (*A–B*). *A*, Fruits (none entire) ($\times 1.4$); *B*, seeds ($\times 6$); *C–D*, testa ($\times 50$, $\times 1000$); *E*, embryos ($\times 10$).



E

Genus: *Nissolia* N. von Jacquin

Phylogenetic Number: 14.08.

Tribe: Aeschynomeneae.

Subtribe: Ormocarpinae.

Species Studied—Species in Genus: 11 spp.—13 spp.

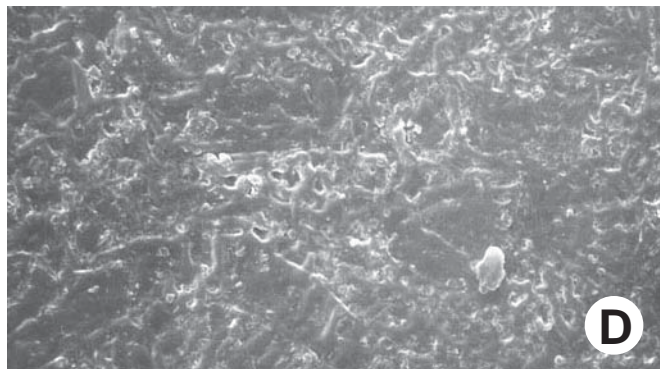
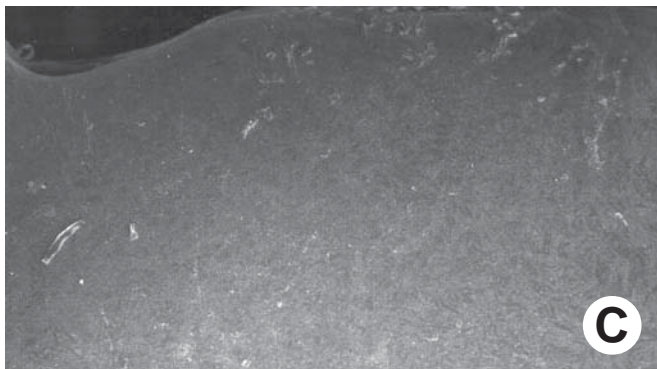
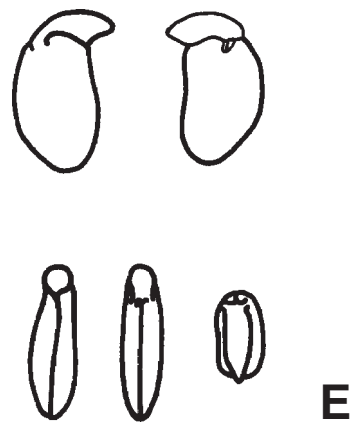
Fruit a loment; $1.5\text{--}4.3 \times 0.5\text{--}1.5 \times 0.09\text{--}0.3$ cm; with persistent or deciduous androecial sheath; with deciduous corolla; with persistent or deciduous calyx (rarely); with calyx shorter than fruit; without orifice formed by curving of fruit or fruit segments; straight or curved; not plicate; not twisted; asymmetrical or symmetrical; oblong or falcate; when asymmetrical with both sutures parallelly curved; not inflated; compressed; without beak; tapered to rounded at apex; apex aligned to oblique with longitudinal axis of fruit; short tapered to rounded at base; base aligned to oblique with longitudinal axis of fruit; with the apex and base uniform in texture; coriaceous; seed chambers externally visible; with the raised seed chambers not torulose. Fruit margin slightly constricted along both margins; without sulcus; plain or embellished; with wing (restricted to apical article). Fruit wing present or absent; 1; 5–15 mm wide; samaroid; apical. Fruit stipitate to substipitate to nonstipitate; with the stipe up to 6 mm long. Fruit indehiscent (if 1-seeded). Replum invisible. Loment indehiscent. Loment segments (articles) conspicuous; 3–10 mm long (sterile (winged) 10–25 mm); widest across seed area; with upper 1 different shape than middle ones; oblong (with apical article with terminal wing) or rectangular. Epicarp dull; monochrome; reddish brown or tan; glabrous or pubescent and indurate; with 1 type of pubescence; crinkled pilose; with pubescence gray; with pubescence uniformly distributed; with simple or glandular hairs; pliable; with hair bases plain; glandular or eglandular; with glandular setae; without spines; not smooth; with elevated features; longitudinally veined relative to fruit length (with 3 to many well developed veins) or reticulately veined; not tuberculate; without cracks. Mesocarp thin; surface not veined; 1-layered; without balsamic vesicles; without fibers; solid; coriaceous. Endocarp dull; monochrome; tan; cobwebby; septate; with septa thicker than paper, firm; coriaceous; not exfoliating; remaining fused to epicarp; entire. Seeds 1–6; length parallel with fruit length; neither overlapping nor touching; in 1 series. Funiculus less than 0.5 mm long; of 1 length only; straight. Aril dry; rim-aril; tan.

Seed $2\text{--}5 \times 1.5\text{--}3.5 \times 1.7$ mm; not overgrown; not angular; asymmetrical; oblong, quadrangular (nearly), or reniform; compressed; with visible radicle and cotyledon lobes; without external groove between radicle and cotyledon lobes; without umbo on seed faces. Testa partially adhering to endocarp (hairs); more or less glossy; not modified by a bloom; colored; monochrome; reddish brown; glabrous; smooth; coriaceous. Fracture lines absent. Rim absent. Wings absent. Raphe from hilum to lens; not bifurcating; darker than testa; black; flush. Hilum visible; with faboid split; with the lips of the faboid split the same color as the rest of the hilum; punctiform to larger than punctiform; up to 0.3 mm long; with curved outline; circular; between cotyledon and radicle lobe; flush; not within corona, halo, or rim or within halo. Hilum halo color lighter than testa. Lens not discernible. Endosperm thick; $1/2$ covering entire embryo; adnate to testa. Cotyledons smooth; both outer faces convex; both the same thickness; both more or less of equal length; not folded; margin entire 180 degrees from base of radicle; similar at apex; partially concealing or not concealing radicle; split over radicle; with lobes; with lobes not touching; with the interface division terminating at base of radicle; without margins recessed; yellow; inner face flat; glabrous around base of radicle. Embryonic axis deflexed; oblique to length of seed. Radicle bulbous (nearly); lobe tip straight; deflexed and parallel to cotyledon width; centered between cotyledons; less than $1/2$ length of cotyledons. Plumule moderately developed; glabrous.

Distribution: Mexico, West Indies, Central America, South America.

Notes: Rudd (1956) monographed the genus and noted that the “fruits are samaralike, 2–5-articulate loment with terminal joint sterile, flat, and winglike.”

Nissolia: *N. leiogyne* N.Y. Sandwith (*E*), *N. schottii* (J. Torrey) A. Gray (*C–D*), *N. spp.* (*A–B*). *A*, Fruits and 1 article ($\times 1.9$); *B*, seeds ($\times 5.3$); *C–D*, testa ($\times 50$, $\times 1000$); *E*, embryos ($\times 5$).



Genus: *Aeschynomene* C. Linnaeus

Phylogenetic Number: 14.09.

Tribe: Aeschynomeneae.

Subtribe: Aeschynomeninae.

Species Studied—Species in Genus: 21 spp.—ca. 150 spp.

Fruit a loment; $0.8\text{--}2 \times 0.4\text{--}0.5 \times 0.1\text{--}0.3$ cm; with deciduous corolla; with persistent or deciduous calyx; with calyx shorter than fruit (in loment that do not articulate); with or without orifice formed by curving of fruit or fruit segments; straight, curved (or slightly curved), S-curved, or 0.5-, 1-, 1.5-, 4-, or 2-coiled; not plicate; not twisted; asymmetrical or symmetrical; circular, linear, moniliform, or falcate; when asymmetrical with 1 straight and 1 curved suture or both sutures parallelly curved; narrowing in several places, resembling *Desmodium* (11.09) fruit; not inflated; compressed or quadrangular; without beak; tapered at apex; apex aligned with longitudinal axis of fruit; tapered at base; base aligned with longitudinal axis of fruit; with the apex and base uniform in texture; coriaceous or fragile, thinner than chartaceous like *Trifolium* (21.06); seed chambers externally visible; with the raised seed chambers not torulose. Fruit margin constricted or not constricted; constricted along both margins or only on 1 margin; without sulcus; plain. Fruit wings absent. Fruit stipitate to substipitate; with the stipe 1–25 mm long. Fruit indehiscent. Replum occasionally visible. Fruit a segment; an intact article; loment segment. Loment indehiscent. Loment segments (articles) inconspicuous; 3–7 mm long; widest across seed area; with all essentially similar in shape; D-shaped or rectangular. Epicarp dull; monochrome; black, brown, green (ish-black), or tan; with surface texture uniform or not uniform, with patches of different texture not restricted to the base and apex; glabrous or pubescent and indurate; with 1 type of pubescence; appressed puberulent or tomentose; with pubescence gray; with pubescence uniformly distributed; with simple or glandular hairs; pliable; with hair bases plain; glandular (sections *Aeschynomene* and *Ochopodium*); with glandular hairs; without spines; smooth or not smooth; with elevated features; veined or not veined; obliquely veined relative to fruit length; not tuberculate; verrucose-rugose, muricate, or faveolate; not exfoliating; without cracks. Mesocarp absent. Endocarp dull; monochrome; tan; smooth; septate; with

septa thicker than paper, firm; with the septa eglandular; ligneous (sub); not exfoliating; remaining fused to epicarp; entire. Seeds 1–18; length parallel with fruit length; neither overlapping nor touching; in 1 series. Funiculus less than 0.5 mm long; of 1 length only; thick; straight. Aril absent.

Seed $1\text{--}6 \times 0.7\text{--}5 \times 2\text{--}2.5$ mm; not overgrown; not angular; asymmetrical; reniform; compressed; with visible radicle and cotyledon lobes; without umbo on seed faces. Testa not adhering to endocarp; glossy; colored; monochrome; black (and greenish) or brown (light); smooth; coriaceous. Fracture lines absent. Rim absent. Raphe not visible. Hilum fully concealed; concealed by funicular remnant; with faboid split; with the lips of the faboid split the same color or lighter colored than the rest of the hilum and therefore conspicuous; larger than punctiform; 1.5 mm long; with curved outline; elliptic; marginal according to radicle tip or between cotyledon and radicle lobe; flush; within halo. Hilum halo color lighter than testa. Lens not discernible. Endosperm thin; 1/2 covering entire embryo; adnate to testa. Cotyledons smooth; both outer faces convex; both the same thickness; both more or less of equal length; not folded; margin entire 180 degrees from base of radicle; similar at apex; not concealing radicle; split over radicle; with lobes; with lobes not touching; with the interface division terminating at base of radicle; without margins recessed; inner face flat; glabrous around base of radicle. Embryonic axis deflexed; perpendicular to length of seed. Radicle bulbous; lobe tip straight or curved; deflexed and parallel to cotyledon width; centered between cotyledons; 1/2 to nearly length of cotyledons. Plumule rudimentary or well developed; glabrous.

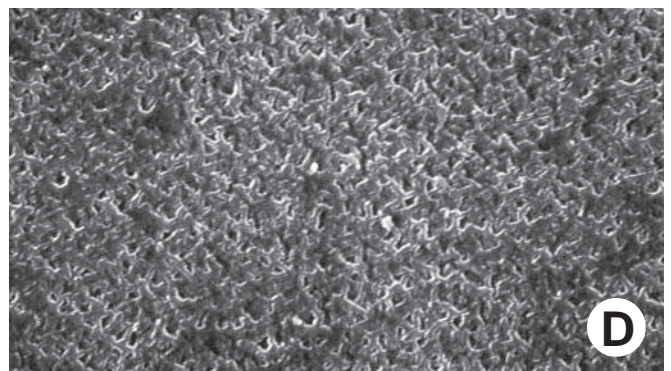
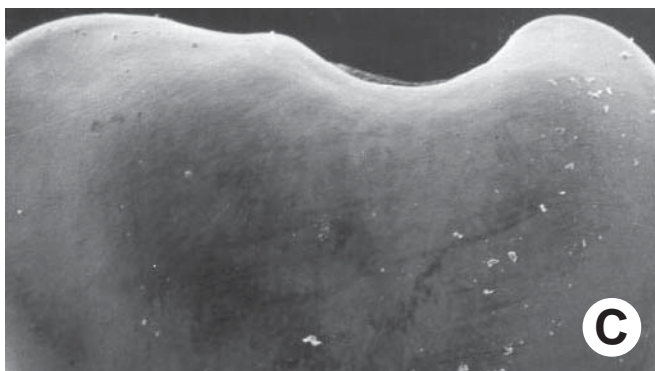
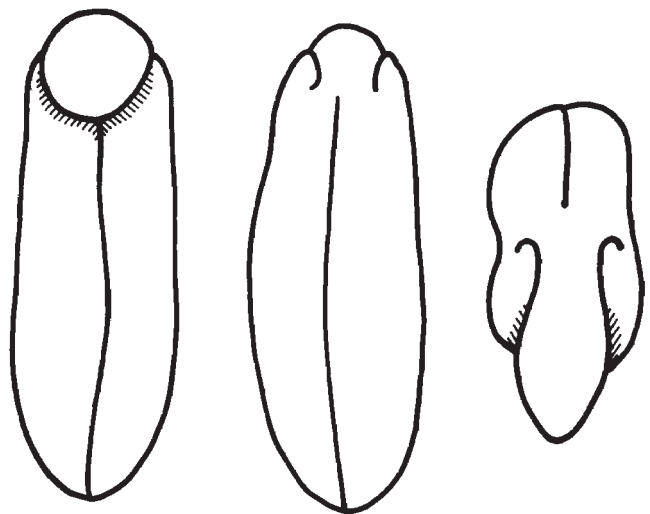
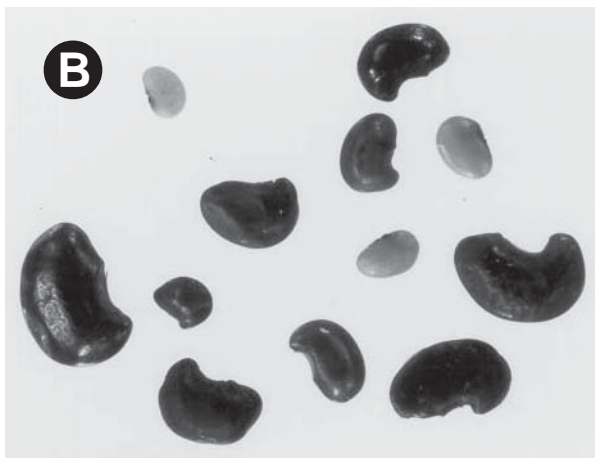
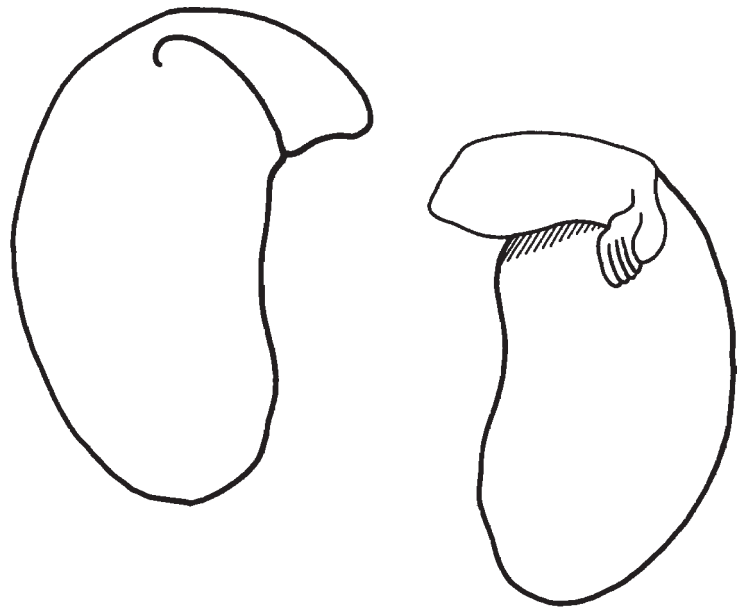
Distribution: Tropics to warm temperate America, Africa, and Asia.

Notes: Rudd (1955) monographed the American species and, according to her subgeneric categories, the U.S. National Seed Herbarium (BARC) has representatives of both subgenera and seven of eight series. The missing series included two species: *A. fluminensis* J. Velloso de Miranda and *A. parviflora* M. Micheli. Of the studied species, only three are restricted to the Old World. Rudd also provided seed and fruit data for each American taxon. Verdcourt (1974) monographed *Aeschynomene* for the Flora of Zambia and included seed and fruit data. Pandey and Jha (1989) reported on the seed structure of *A. aspera* C. Linnaeus (type for genus) and *A. indica* C. Linnaeus. Rudd (1955) re-

corded the variable epicarp surfaces of articles using these descriptors: (Hairs) appressed-pubescent, ciliate, crisp-pubescent, glabrate, glabrous, glandular-hispidulous, hispid, hispidulous, pubescent, sericeous, subappressed hairs, subglabrous, villous-hispid, white-pubescent; (surface) faveolate, muricate, muricate in center of article, reticulate-veiny, rugose, smooth, tuberculate, tuberculate bases of hairs..., veiny, ventricose, verrucose, and verrucose at center of article. All species of *Aeschynomene* are noxious weeds in rice (*Oryza sativa* C. Linnaeus) in Arkansas.

Aeschynomene: *A. virginica* (C. Linnaeus) N.L. Britton,
E.E. Sterns & J.F. Poggenberg (*C–E*), *A. spp.* (*A–B*).
A, Articles and broken and entire fruits ($\times 1.9$); *B*,
seeds ($\times 3.6$); *C–D*, testa ($\times 50$, $\times 1000$); *E*, embryos
($\times 10$).

3



Genus: *Soemmeringia* C.F.P. von Martius

Phylogenetic Number: 14.10.

Tribe: Aeschynomeneae.

Subtribe: Aeschynomeninae.

Species Studied—Species in Genus: 1 sp.—1 sp.

Fruit a loment; $0.4\text{--}0.5 \times 0.18\text{--}0.2 \times 0.05\text{--}0.06$ cm; with persistent or deciduous androecial sheath; with persistent or deciduous corolla; with various petals; with persistent calyx; with calyx longer than fruit; without orifice formed by curving of fruit or fruit segments; somewhat contorted; somewhat plicate to not plicate; not twisted; asymmetrical; moniliform; when asymmetrical with both sutures parallelly curved; not inflated; compressed; without beak; rounded at apex; apex aligned with longitudinal axis of fruit; rounded at base; base aligned with longitudinal axis of fruit; with the apex and base uniform in texture; chartaceous; seed chambers externally visible; with the raised seed chambers not torulose. Fruit margin constricted along both margins; without sulcus; plain. Fruit wings absent. Fruit nonstipitate. Fruit indehiscent. Replum invisible. Loment indehiscent. Loment segments (articles) inconspicuous; 1.5–2 mm long; widest across seed area; with all essentially similar in shape; circular. Epicarp dull; monochrome; brown; glabrous; without spines; not smooth; with elevated features; reticulately veined; not tuberculate; not exfoliating; without cracks. Mesocarp absent. Endocarp dull; monochrome; tan; smooth; septate; with septa thicker than paper, firm; with the septa eglandular; chartaceous; not exfoliating; remaining fused to epicarp; entire. Seeds 2–4; length parallel with fruit length; neither overlapping nor touching; in 1 series. Funiculus less than 0.5 mm long; of 1 length only; flattened; straight. Aril dry; rim-aril; reddish brown.

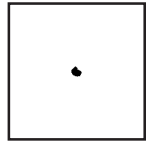
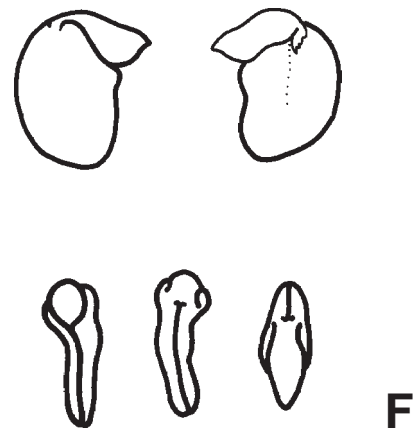
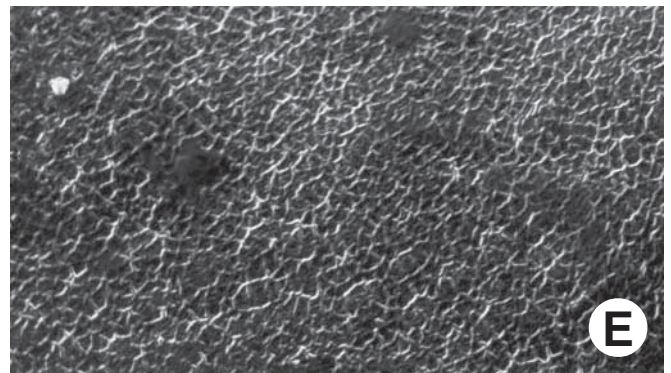
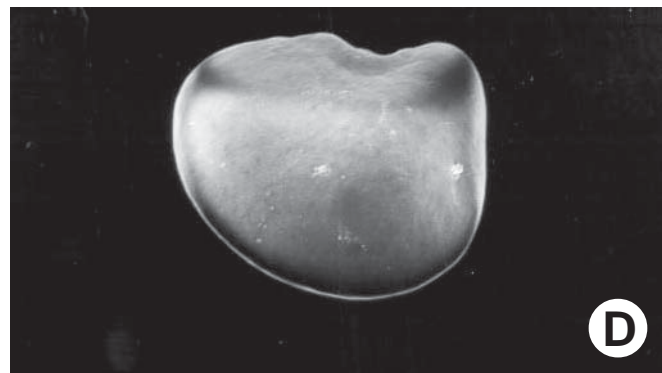
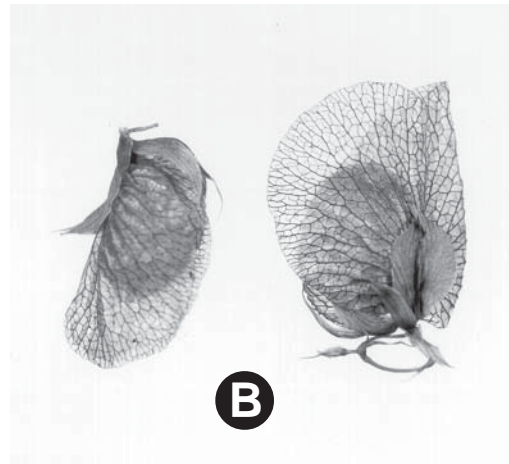
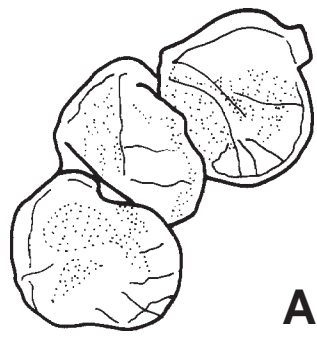
Seed $1 \times 1 \times 0.3$ mm; not overgrown; not angular; asymmetrical; mitaform; compressed; with visible radicle and cotyledon lobes; without umbo on seed faces. Testa not adhering to endocarp; glossy or dull; not modified by a bloom; colored; monochrome; brown (dark brown) or green; glabrous; smooth; coriaceous. Fracture lines absent. Rim absent. Wings absent. Raphe not visible. Hilum visible or fully concealed; concealed by funicular remnant; with faboid split; with the lips of the faboid split the same color as the rest of the hilum; punctiform; between cotyledon and radicle lobe; recessed; not

within corona, halo, or rim. Lens discernible; less than 0.5 mm in length; with margins straight or curved; irregular; irregular; not in groove of raphe; adjacent to hilum; 0.2 mm from hilum; mounded; dissimilar color from testa; darker than testa; black (on dark brown testa) or brown (on green testa); not within corona, halo, or rim. Endosperm thick; 1/2 covering entire embryo; adnate to testa. Cotyledons smooth; both outer faces convex; both the same thickness; both more or less of equal length; not folded; margin not entire 180 degrees from base of radicle; similar at apex; partially concealing radicle; split over radicle; with lobes; with lobes not touching; with the interface division terminating at base of radicle; without margins recessed; yellow; inner face flat; glabrous around base of radicle. Embryonic axis deflexed; oblique to length of seed. Radicle nearly bulbous; lobe tip straight; deflexed and parallel to cotyledon width; centered between cotyledons; less than 1/2 length of cotyledons. Plumule moderately developed; glabrous.

Distribution: Venezuela, Brazil, and Bolivia.

Notes: Apparently the marcescent corolla acts as a wing in fruit dispersal and therefore aids in seed dissemination.

Soemmeringia: *S. semperflorens* C.F.P. von Martius (A–F). A, Partial fruit ($\times 14$); B, fruit (*left*) and fruits in marcescent corollas (*right*) ($\times 3.7$); C, seeds ($\times 9$); D–E, testa ($\times 50$, $\times 1000$); F, embryos ($\times 15$).



Genus: *Kotschya* S.F.L. Endlicher

Phylogenetic Number: 14.11.

Tribe: Aeschynomeneae.

Subtribe: Aeschynomeninae.

Species Studied—Species in Genus: 7 spp.—ca. 30 spp.

Fruit a loment; $0.2\text{--}3.9$ (see Notes) $\times 0.2\text{--}0.4 \times 0.15$ cm; with persistent corolla; with standard; with persistent calyx; with calyx longer than fruit; without orifice formed by curving of fruit or fruit segments; straight; plicate (see Notes); not twisted; asymmetrical; when asymmetrical with 1 straight and 1 curved suture; narrowing in several places, resembling *Desmodium* fruit; not inflated; compressed; without beak; rounded at apex; apex aligned with longitudinal axis of fruit; rounded at base; base aligned with longitudinal axis of fruit; with the apex and base uniform in texture; chartaceous; seed chambers externally visible; with the raised seed chambers not torulose. Fruit margin constricted only on 1 margin; without sulcus; plain. Fruit wings absent. Fruit substipitate. Fruit indehiscent. Replum invisible. Loment indehiscent. Loment segments (articles) inconspicuous; 2–6 mm long; widest across seed area; with all essentially similar in shape; D-shaped. Epicarp dull; monochrome; brown (including reddish) or tan; glabrous or pubescent and indurate; with 2 types of pubescence; pilose; with pubescence gray and yellow; with golden hooked hairs and gray plain hairs; with pubescence uniformly distributed; with simple hairs; pliable; with hair bases swollen or plain; without spines; not smooth; with elevated features; reticulately veined; not tuberculate; tuberculate (bases of hairs); not exfoliating; without cracks. Mesocarp absent. Endocarp dull; monochrome; tan; smooth; septate; with septa thin (tissue paper-like), flexible; with the septa eglandular; chartaceous; not exfoliating; remaining fused to epicarp; entire. Seeds 1–9; length parallel with fruit length; neither overlapping nor touching; in 1 series. Funiculus less than 0.5 mm long; of 1 length only; filiform; straight. Aril dry; rim-aril; yellow.

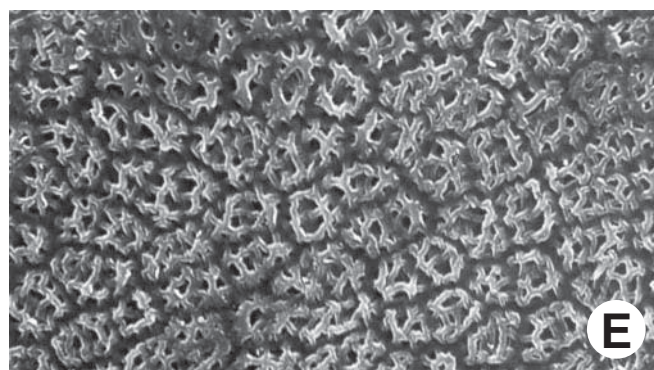
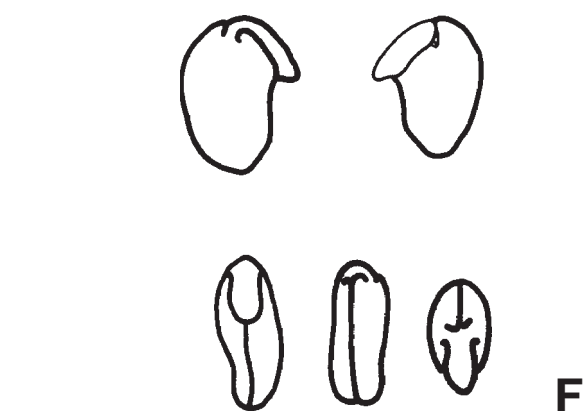
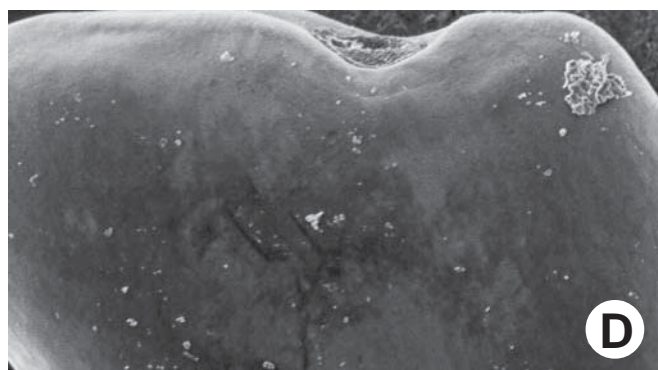
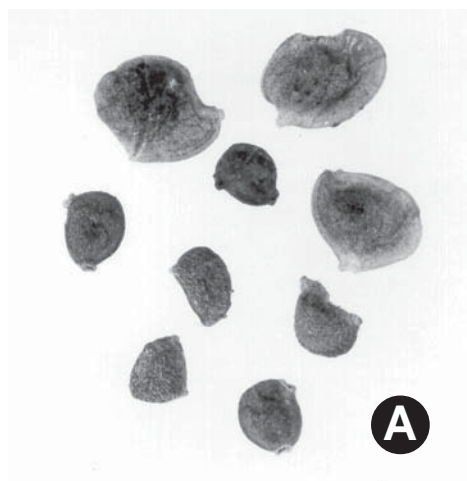
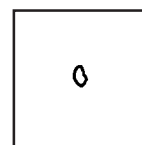
Seed $2\text{--}4.7 \times 1.2\text{--}3 \times 0.5\text{--}1.7$ mm; not overgrown; not angular; asymmetrical; elliptic, circular (sub), reniform (to ellipsoid-reniform), or triangular; compressed; with visible radicle and cotyledon lobes; without umbo on seed faces. Testa not adhering to endocarp; glossy; not modified by a bloom; colored; monochrome; reddish

black, brown (reddish or gray), green, or yellow; glabrous; smooth; osseous. Fracture lines absent. Rim absent. Wings absent. Raphe not visible. Hilum visible; with faboid split; with the lips of the faboid split the same color as the rest of the hilum; punctiform; between cotyledon and radicle lobe; flush; not within corona, halo, or rim. Lens discernible; equal to or greater than 0.5 mm in length or less than 0.5 mm in length; 0.5 mm long; with margins straight; linear; not in groove of raphe; adjacent to hilum; less than 0.5 mm from hilum; recessed; dissimilar color from testa; darker than testa; black; not within corona, halo, or rim. Endosperm absent. Cotyledons smooth; both outer faces convex; both the same thickness; both more or less of equal length; not folded; margin entire 180 degrees from base of radicle; similar at apex; partially or not concealing radicle; split over radicle; with lobes; with lobes not touching; with the interface division terminating at base of radicle; without margins recessed; red; inner face flat; glabrous around base of radicle. Embryonic axis deflexed; oblique to length of seed. Radicle linear; lobe tip straight or curved; oblique to cotyledons; centered between cotyledons; less than 1/2 length of cotyledons. Plumule rudimentary.

Distribution: Tropical Africa and Madagascar.

Notes: Verdcourt (1974) described 19 species from Zambia and noted that if the fruit is composed of several articles, then the fruit is “folded like a concertina.” Upon opening the calyx, the fruit disarticulates, making length measurements difficult. Our fruit length range is based on maximum and minimum number of articles multiplied by the maximum and minimum article lengths.

Kotschya: *K. africana* S.F.L. Endlicher var. *bequaertii* (E.A.J. De Wildeman) B. Verdcourt (*D–F*), *K. spp.* (*A–C*). *A*, Articles, fruits in calyx and corolla ($\times 4.3$); *B*, fruit in flower ($\times 3$); *C*, seeds ($\times 5.8$); *D–E*, testa ($\times 50$, $\times 1000$); *F*, embryos ($\times 8$).



Genus: *Smithia* W. Aiton

Phylogenetic Number: 14.12.

Tribe: Aeschynomeneae.

Subtribe: Aeschynomeninae.

Species Studied—Species in Genus: 12 spp.—ca. 30 spp.

Fruit a loment; $1\text{--}1.5$ (estimated) $\times 0.15\text{--}0.3 \times 0.2\text{--}0.22$ cm; with deciduous corolla; with persistent calyx; with calyx longer than fruit; without orifice formed by curving of fruit or fruit segments; contorted; plicate; not twisted; asymmetrical; moniliform; when asymmetrical with both sutures parallelly curved; not inflated; compressed; without beak; rounded at apex; apex aligned with longitudinal axis of fruit (probably); rounded at base; base aligned with longitudinal axis of fruit (probably); with the apex and base uniform in texture; chartaceous; seed chambers externally visible. Fruit margin constricted along both margins; without sulcus; plain. Fruit wings absent. Fruit substipitate. Fruit indehiscent. Replum invisible. Loment indehiscent. Loment segments (articles) inconspicuous; $2\text{--}3$ mm long; widest across seed area; with all essentially similar in shape; circular. Epicarp dull; monochrome; glabrous; without spines; smooth or not smooth; with elevated features; veined or not reticulately veined; tuberculate or not tuberculate; with solid tubercles on each valve; tuberculate; not exfoliating; without cracks. Mesocarp absent. Endocarp dull; monochrome; tan; septate; with septa thicker than paper, firm; with the septa eglandular; chartaceous; not exfoliating; remaining fused to epicarp; entire. Seeds $4\text{--}7$; length parallel with fruit length; neither overlapping nor touching; in 1 series. Funiculus less than 0.5 mm long; of 1 length only. Aril absent.

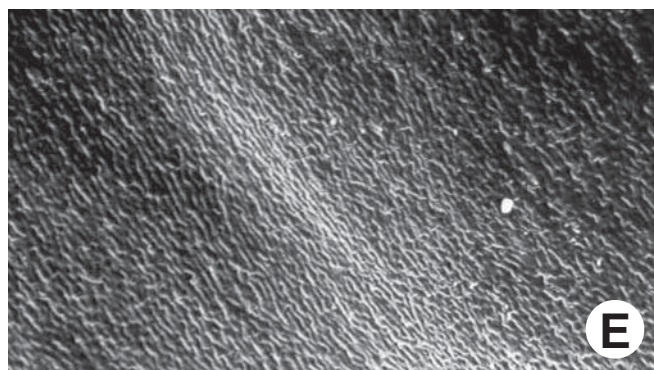
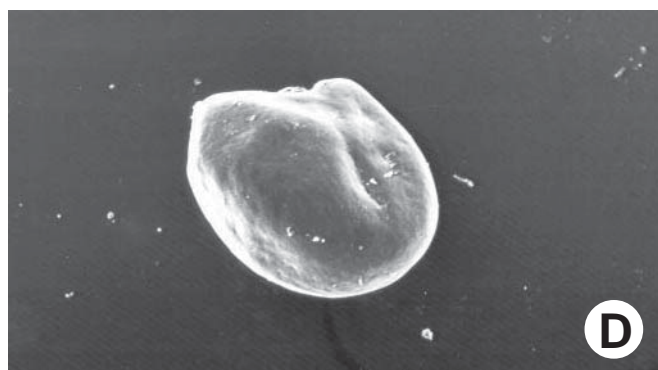
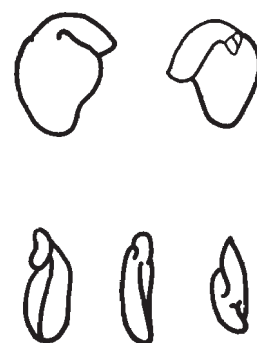
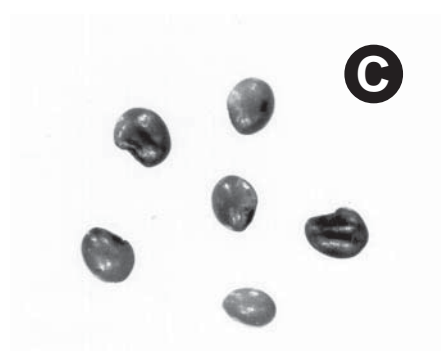
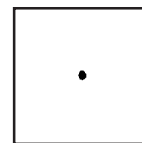
Seed $1.5\text{--}1.8 \times 1.3 \times 0.5$ mm; not overgrown; not angular; asymmetrical; reniform; compressed; with visible radicle and cotyledon lobes; without umbo on seed faces. Testa not adhering to endocarp; dull; not modified by a bloom; colored; monochrome; reddish brown; glabrous; smooth; coriaceous. Fracture lines absent. Rim absent. Wings absent. Raphe not visible. Hilum visible; with faboid split; with the lips of the faboid split the same color as the rest of the hilum; punctiform; between cotyledon and radicle lobe; flush; not within corona, halo, or rim or within halo. Hilum halo color darker than testa. Lens discernible; less than 0.5 mm in length; with margins curved; elliptic; not in groove of

raphe; adjacent to hilum; mounded; dissimilar color from testa; darker than testa; black; not within corona, halo, or rim. Endosperm thin; $1/2$ covering entire embryo; adnate to testa. Cotyledons smooth; both outer faces convex; both the same thickness; both more or less of equal length; not folded; margin entire 180 degrees from base of radicle; differing at apex (1 concealed by overarching radicle and other auriculate and concealing radicle); partially concealing radicle; entire over radicle; without lobes; with the interface division terminating at base of radicle; without margins recessed; yellow; inner face flat; glabrous around base of radicle. Embryonic axis deflexed; oblique to length of seed. Radicle linear; lobe tip straight; deflexed and parallel to cotyledon length or width; not centered between cotyledons (radicle outside 1 cotyledon and inside other, therefore junctions for each cotyledon different); $1/2$ to nearly length of cotyledons. Plumule moderately developed; glabrous.

Distribution: Old World tropics, mainly Asia, Madagascar, and Africa.

Notes: Dewit and Duvigneaud (1954) evaluated the species of *Smithia* in the Congo. The testa is thin, and the cotyledons are soft, making it difficult to remove the embryo. This is unlike most faboid legume seeds, whose embryos are easy to remove from the testa.

Smithia: *S. elliotti* E.G. Baker var. *elliotti* (B), *S. purpurea* W.J. Hooker (D–F), *S. spp.* (A, C). A, Fruits and fruits within calyx and bracts ($\times 5$); B, young fruit ($\times 10$, modified from Gillett et al. 1971); C, seeds ($\times 8$); D–E, testa ($\times 50$, $\times 1000$); F, embryos ($\times 15$).



Genus: *Geissaspis* R. Wight & G.A.W. Arnott

Phylogenetic Number: 14.13.

Tribe: Aeschynomeneae.

Subtribe: Aeschynomeninae.

Species Studied—Species in Genus: 2 spp.—3 spp.

Fruit a legume or loment; unilocular; $0.35\text{--}0.8 \times 0.25\text{--}0.35 \times 0.1\text{--}0.15$ cm; with persistent androecial sheath; with deciduous corolla; with persistent or deciduous calyx; with calyx shorter than fruit; without orifice formed by curving of fruit or fruit segments; straight; not plicate; not twisted; asymmetrical; when asymmetrical with 1 straight and 1 curved suture; widest near middle or D-shaped; not inflated; compressed; without or with beak; straight or declined; with solid beak the same color and texture as fruit (if present, quite small); rounded at apex; apex oblique with longitudinal axis of fruit; rounded at base; base aligned with longitudinal axis of fruit (more or less); with the apex and base uniform in texture; chartaceous; seed chambers externally visible; with the raised seed chambers not torulose. Fruit margin constricted along both margins; without sulcus; plain or embellished; with wing. Fruit wing 1 (article); $0.5\text{--}0.6$ mm wide; continuous wing around fruit; on 1 suture. Fruit substipitate. Fruit indehiscent. Replum invisible. Loment indehiscent. Loment segments (articles) inconspicuous; $5\text{--}6$ mm long; widest across seed area; with all essentially similar in shape; D-shaped. Epicarp dull; monochrome or multicolored; streaked; brown or tan; with red overlay; with mottling over seed chambers; pubescent and indurate; with 1 type of pubescence; with pubescence brown; pliable; with hair bases plain; eglandular; without spines; not smooth; with elevated features; reticulately veined; not tuberculate; not exfoliating; with cracks (if cracked because fruit is fragile) or without cracks; cracking irregular. Mesocarp absent. Endocarp dull; monochrome; brown or tan; smooth; septate; with septa thicker than paper, firm; with the septa eglandular; chartaceous; not exfoliating; remaining fused to epicarp; entire. Seeds 1 or 2; length parallel with fruit length; neither overlapping nor touching; in 1 series. Funiculus less than 0.5 mm long; of 1 length only; thick; straight. Aril absent.

Seed $2.2\text{--}2.8 \times 1.8\text{--}2.2 \times 0.9\text{--}1.1$ mm; not overgrown; not angular; asymmetrical; reniform; compressed; with

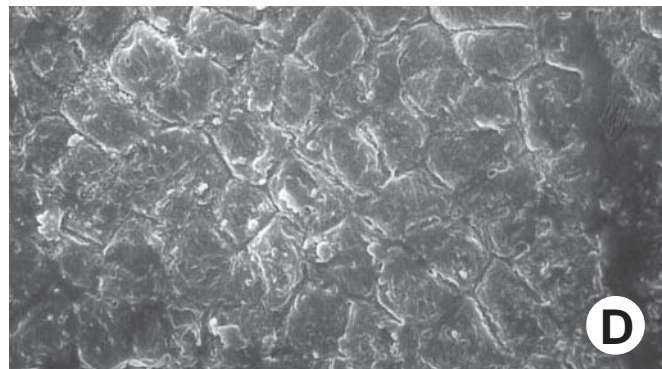
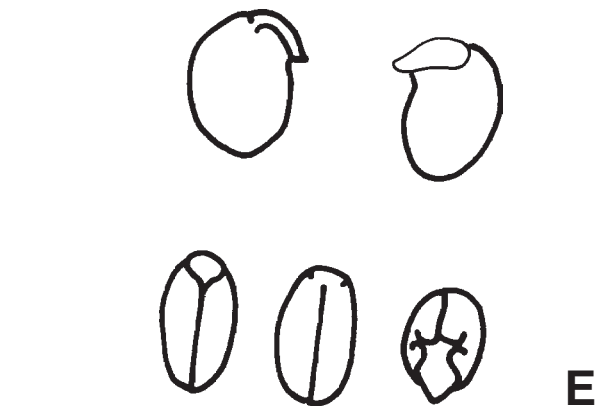
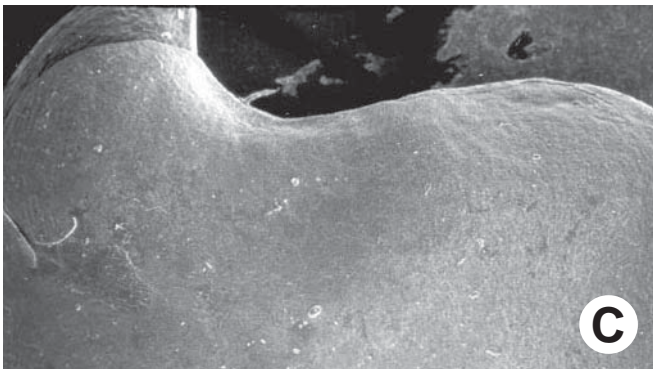
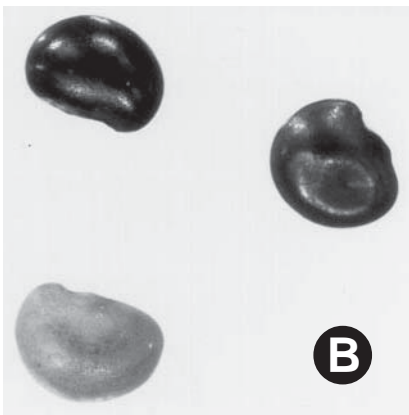
visible radicle and cotyledon lobes; without umbo on seed faces. Testa not adhering to endocarp; dull; not modified by a bloom; colored; monochrome; reddish brown; glabrous; smooth; osseous. Fracture lines absent. Rim absent. Wings absent. Raphe visible or not visible; from hilum to lens; not bifurcating; color of testa or darker than testa; black (ish); recessed. Hilum visible; with faboid split; with the lips of the faboid split the same color as the rest of the hilum; punctiform; marginal according to radicle tip or between cotyledon and radicle lobe; recessed; within rim or not within corona, halo, or rim. Hilum rim color of testa. Lens discernible; equal to or greater than 0.5 mm in length; $1\text{--}2$ mm long; with margins curved; more or less circular; not in groove of raphe; adjacent to hilum; 2 mm from hilum; mounded; dissimilar color from testa; darker than testa; black (ish); not within corona, halo, or rim. Endosperm thin; $1/2$ covering entire embryo; adnate to testa. Cotyledons smooth; both outer faces convex; both the same thickness; both more or less of equal length; not folded; margin entire 180 degrees from base of radicle; similar at apex; partially concealing to not concealing radicle; split over radicle; with lobes; with lobes touching (auriculate); with the interface division terminating at base of radicle; without margins recessed; yellow; inner face flat; glabrous around base of radicle. Embryonic axis deflexed; oblique to length of seed. Radicle more or less bulbous; lobe tip straight; oblique to cotyledons; centered between cotyledons; less than $1/2$ length of cotyledons. Plumule rudimentary; glabrous.

Distribution: Tropical and subtropical Asia.

Notes: Duvigneaud (1954b) evaluated the genus.

Geissaspis: *G. cristata* R. Wight & G.A.W. Arnott (C–E), *G. spp.* (A–B). A, Articles and fruits concealed in bracts ($\times 4.5$); B, seeds ($\times 8.6$); C–D, testa ($\times 50$, $\times 1000$); E, embryos ($\times 8$).

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Genus: *Bryaspis* P. Duvigneaud

Phylogenetic Number: 14.14.

Tribe: Aeschynomeneae.

Subtribe: Aeschynomeneinae.

Species Studied—Species in Genus: 1 sp.—2 spp.

Fruit a loment; $0.8\text{--}1.3 \times 0.2 \times 0.14\text{--}0.15$ cm; with deciduous corolla; with deciduous calyx (within large bract); without orifice formed by curving of fruit or fruit segments; straight; not plicate; not twisted; asymmetrical; when asymmetrical with 1 straight and 1 curved suture; narrowing in several places, resembling *Desmodium* fruit; not inflated; compressed; without beak; rounded at apex; apex oblique with longitudinal axis of fruit; rounded at base; base aligned with longitudinal axis of fruit; with the apex and base uniform in texture; chartaceous; seed chambers externally visible; with the raised seed chambers not torulose. Fruit margin constricted only on 1 margin; without sulcus; plain. Fruit wings absent. Fruit nonstipitate. Fruit indehiscent. Replum invisible. Fruit a segment; an intact article; entire. Loment indehiscent. Loment segments (articles) inconspicuous; 2–3 mm long; widest across seed area; with all essentially similar in shape; D-shaped. Epicarp dull; monochrome; reddish brown; glabrous; eglandular; without spines; not smooth; with elevated features; irregularly veined; not tuberculate; subvesicular; not exfoliating; without cracks. Mesocarp absent. Endocarp dull; monochrome; reddish brown; smooth; septate; with septa thicker than paper, firm; with the septa eglandular; chartaceous; not exfoliating; remaining fused to epicarp; entire. Seeds 1 or 2; length parallel with fruit length; neither overlapping nor touching; in 1 series. Funiculus less than 0.5 mm long; of 1 length only; thick; straight. Aril absent.

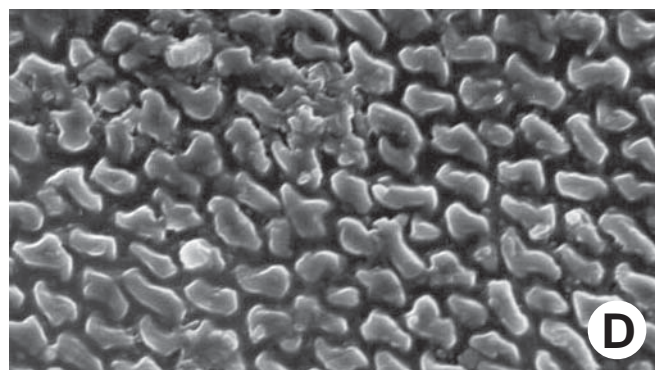
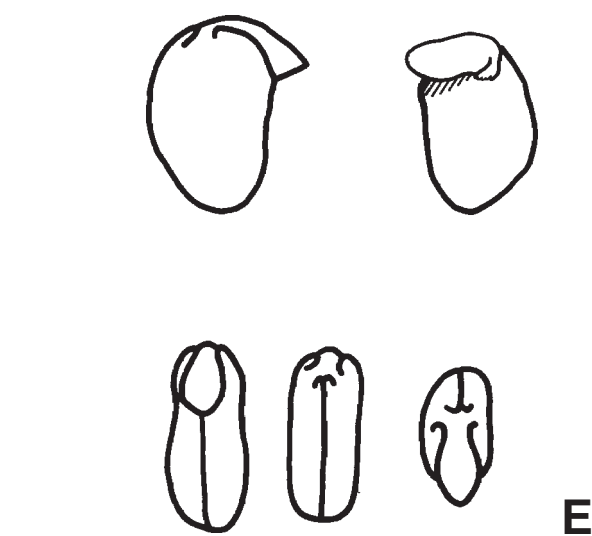
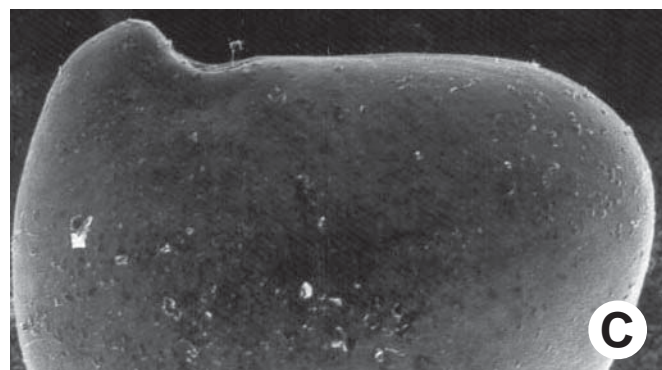
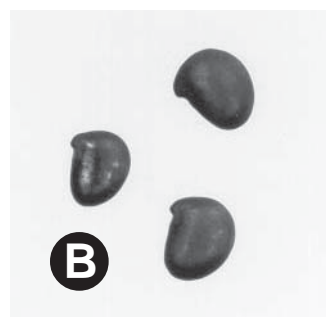
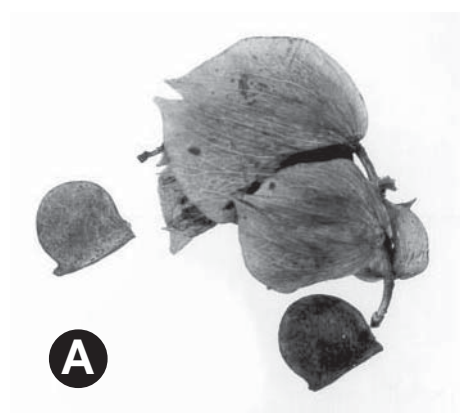
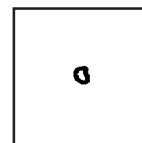
Seed $2\text{--}2.5 \times 1.6\text{--}2 \times 1.2\text{--}1.5$ mm; not overgrown; not angular; asymmetrical; D-shaped (with radicle lobe); terete; with visible radicle and cotyledon lobes; without umbo on seed faces. Testa not adhering to endocarp; dull; not modified by a bloom; colored; monochrome; tan; glabrous; smooth; coriaceous. Fracture lines absent. Rim absent. Wings absent. Raphe not visible. Hilum visible; with faboid split; with the lips of the faboid split the same color as the rest of the hilum; larger than punctiform or punctiform; 0.3 mm long; with curved outline; circular; between cotyledon and radicle lobe; flush; not within corona, halo, or rim. Lens discernible;

equal to or greater than 0.5 mm in length; 0.5 mm long; with margins straight; linear (centered within a discolored area); not in groove of raphe; confluent with hilum; recessed; dissimilar color from testa; darker than testa; black; not within corona, halo, or rim. Endosperm absent. Cotyledons smooth; both outer faces convex; both the same thickness; both more or less of equal length; not folded; margin entire 180 degrees from base of radicle; similar at apex; partially concealing radicle; split over radicle; with lobes; with lobes not touching; with the interface division terminating at base of radicle; without margins recessed; yellow; inner face flat; glabrous around base of radicle. Embryonic axis deflexed; oblique to length of seed. Radicle bulbous; lobe tip straight; deflexed and parallel to cotyledon width; centered between cotyledons; less than $1/2$ length of cotyledons. Plumule rudimentary; glabrous.

Distribution: Western tropical Africa.

Notes: Duvigneaud (1954b) separated *Geissaspis* (14.13) from *Bryaspis* by stipule, bract, standard, keel, and fruit characters. His fruit key characters were: Fruit membranaceous and article densely reticulate for *Geissaspis* and fruit firmer and article faintly reticulate for *Bryaspis*.

Bryaspis: *B. lupulina* (L.D. Planchon ex G. Benth) P. Duvigneaud (A–E). A, Articles and fruit within bracts ($\times 1.9$); B, seeds ($\times 5$); C–D, testa ($\times 50$, $\times 1000$); E, embryos ($\times 10$).



Genus: *Humularia* P. Duvigneaud

Phylogenetic Number: 14.15.

Tribe: Aeschynomeneae.

Subtribe: Aeschymeninae.

Species Studied—Species in Genus: 18 spp.—ca. 40 spp.

Fruit a legume or loment; unilocular; $0.5\text{--}1.5 \times 0.4\text{--}0.55 \times 0.3$ cm; with persistent or deciduous androecial sheath; with persistent or deciduous corolla; with various petals; with persistent calyx; with calyx shorter than fruit; without orifice formed by curving of fruit or fruit segments; straight; not plicate; not twisted; asymmetrical; when asymmetrical with 1 straight and 1 curved suture; narrowing in several places, resembling *Desmodium* (11.09) fruit; not inflated; flattened; without or with beak; with solid beak the same color and texture as fruit; rounded at apex; apex aligned with longitudinal axis of fruit; short tapered at base; base aligned with longitudinal axis of fruit; with the apex and base uniform in texture; coriaceous; seed chambers externally visible; with the raised seed chambers not torulose. Fruit margin constricted on 1 margin and slightly constricted on the other margin; without sulcus; plain. Fruit wings absent. Fruit nonstipitate. Fruit indehiscent. Replum invisible. Loment indehiscent. Loment segments (articles) inconspicuous; 6.5 mm long; widest across seed area; with all essentially similar in shape; D-shaped. Epicarp dull; monochrome; brown; glabrous or pubescent but soon deciduous; with 1 type of pubescence; puberulent; with pubescence gray; with pubescence uniformly distributed; with simple or glandular hairs; pliable; with hair bases plain; glandular or eglandular; with glandular hairs; without spines; not smooth; with elevated features; reticulately veined; not tuberculate; warty (scattered to numerous); not exfoliating; without cracks. Mesocarp absent. Endocarp dull; monochrome; tan; smooth; septate, subseptate, or nonseptate; with septa thicker than paper, firm; with the septa eglandular; coriaceous; not exfoliating; remaining fused to epicarp; entire. Seeds 1 or 2; length parallel with fruit length; neither overlapping nor touching; in 1 series. Funiculus less than 0.5 mm long; of 1 length only; thick; straight. Aril dry; rim-aril; covering less than 1/2 of seed; dark reddish brown.

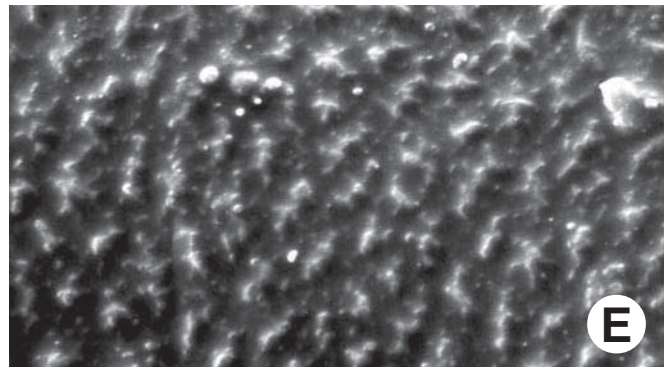
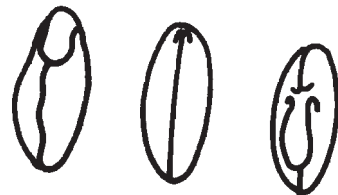
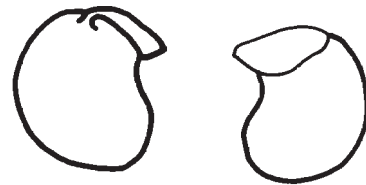
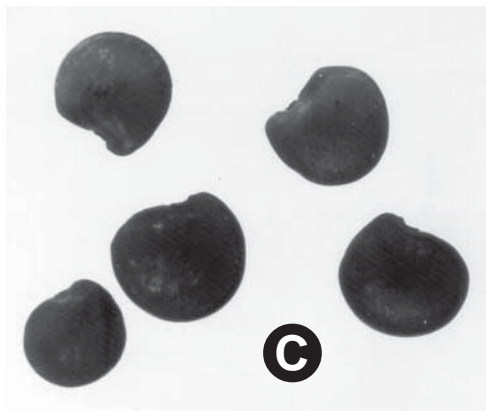
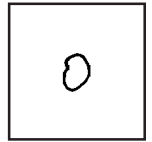
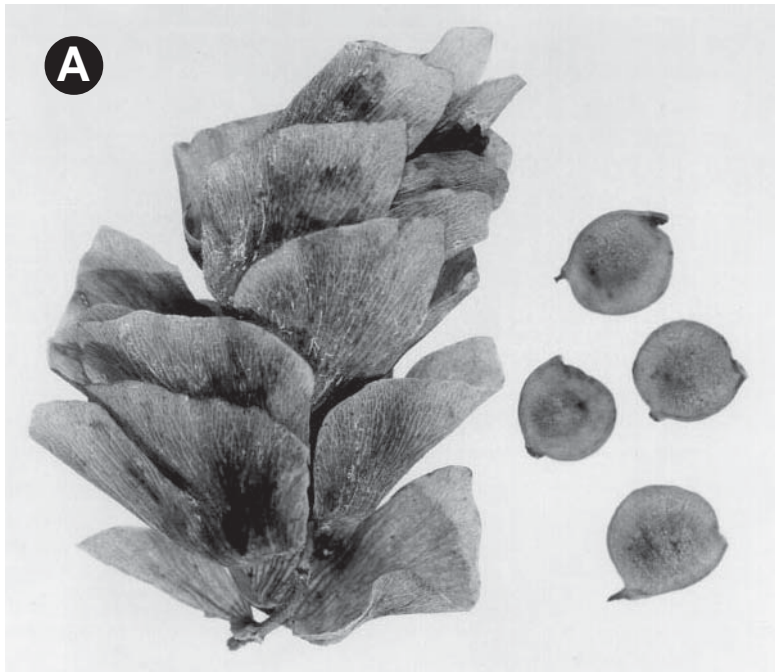
Seed $2.4\text{--}4 \times 2.2\text{--}3.5 \times 1\text{--}2$ mm; not overgrown; not angular; asymmetrical; nearly circular, D-shaped, quadrangular (nearly), or reniform; compressed; with

visible radicle and cotyledon lobes; without umbo on seed faces. Testa not adhering to endocarp; dull; not modified by a bloom; colored; monochrome; purplish black or brown (reddish); smooth; coriaceous. Fracture lines absent. Rim absent. Wings absent. Raphe not visible. Hilum partially concealed; concealed by funicular remnant; without faboid split; larger than punctiform; 0.3–0.4 mm long; with curved outline; circular; between cotyledon and radicle lobe; flush; not within corona, halo, or rim. Lens discernible or not discernible; less than 0.5 mm in length (0.1–0.2 mm); with margins straight or curved; irregular, linear, or wedge-shaped; irregular; not in or in groove of raphe; adjacent to hilum; flush or recessed; dissimilar color from testa; darker than testa; black; not within corona, halo, or rim. Endosperm thin; 1/2 covering entire embryo; adnate to testa. Cotyledons smooth; both outer faces convex; both the same thickness; both more or less of equal length; not folded; margin entire 180 degrees from base of radicle; similar at apex; partially concealing radicle; split over radicle; with lobes; with lobes not touching; with the interface division terminating at base of radicle; without margins recessed; red; inner face flat; glabrous around base of radicle. Embryonic axis oblique; oblique to length of seed. Radicle bulbous; lobe tip straight; oblique to cotyledons; centered between cotyledons; less than 1/2 or 1/2 to nearly length of cotyledons. Plumule rudimentary; glabrous.

Distribution: Africa.

Notes: Duvigneaud (1954a) analyzed the tropical African species and Verdcourt (1974) described the species for Flora of Zambia.

Humularia: *H. chevalieri* (E.A.J. De Wildeman) P.A. Duvigneaud (*D–F*), *H. drepanocephalus* (E.G. Baker) P.A. Duvigneaud (*B*), *H. spp.* (*A, C*). *A*, Articles and fruits concealed in bracts ($\times 2.8$); *B*, fruit ($\times 2.8$, modified from Gillett et al. 1971); *C*, seeds ($\times 5.7$); *D–E*, testa ($\times 50$, $\times 1000$); *F*, embryos ($\times 5$).



Genus: *Cyclocarpa* A. Afzelius ex J.G. Baker

Phylogenetic Number: 14.16.

Tribe: Aeschynomeneae.

Subtribe: Aeschynomeninae.

Species Studied—Species in Genus: 1 sp.—1 sp.

Fruit a loment; 1.5–2.2 (diameter of coiled fruit 0.4–0.6 cm) \times 0.15–0.27 \times 0.03–0.04 cm; with deciduous corolla; with deciduous calyx; with orifice formed by curving of fruit or fruit segments; 1.5-coiled; not plicate; not twisted; symmetrical; circular; not inflated; flattened; without beak; rounded at apex; apex oblique with longitudinal axis of fruit (slightly); rounded at base; base oblique with longitudinal axis of fruit; with the apex and base uniform in texture; coriaceous; seed chambers externally invisible. Fruit margin not constricted; without sulcus; plain. Fruit wings absent. Fruit substipitate. Fruit with all layers dehiscing; separating from sutures and along loment segment margins. Dehiscence of valves along both sutures (fig. B); passive. Replum visible (when articles separate). Loment dehiscing along 1 suture. Loment segments (articles) inconspicuous; 1.5–2 mm long; widest across seed area; with upper or lower 1 different shape than middle ones; trapezoid. Epicarp dull; monochrome; dark brown; glabrous; eglandular; without spines; not smooth; with elevated features; reticulately veined; not tuberculate; not exfoliating; without cracks. Mesocarp absent. Endocarp glossy; monochrome; dark brown; spongy; septate; with septa thicker than paper, firm; with the septa eglandular; chartaceous; not exfoliating; remaining fused to epicarp; entire. Seeds 8–11; length parallel with fruit length; neither overlapping nor touching; in 1 series. Funiculus less than 0.5 mm long; of 1 length only; filiform; straight. Aril absent.

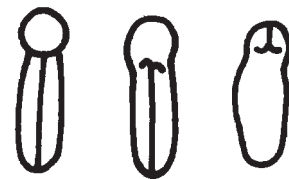
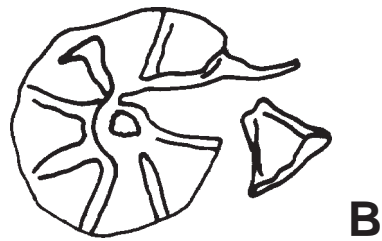
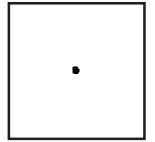
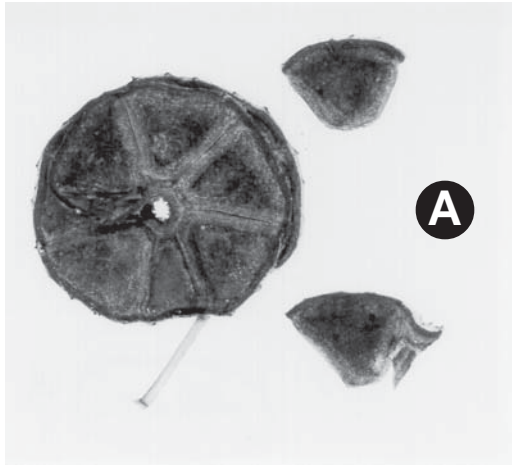
Seed 0.7–1.2 \times 0.5–1 \times 0.25–0.5 mm; not overgrown; not angular; asymmetrical; mitaform; compressed; with visible radicle and cotyledon lobes; without umbo on seed faces. Testa not adhering to endocarp; nearly glossy; colored; monochrome; dark brown, green, or tan; glabrous; smooth; coriaceous. Fracture lines absent. Rim absent. Raphe not visible. Hilum visible; with faboid split; with the lips of the faboid split the same color as the rest of the hilum; punctiform; between cotyledon and radicle lobe; flush; not within corona, halo, or rim. Lens discernible; less than 0.5 mm in length; with margins curved; more or less circular; not

in groove of raphe; adjacent to hilum; 0.5 mm from hilum; flush; dissimilar color from testa; darker than testa; black (ish); not within corona, halo, or rim. Endosperm thick; 1/2 covering entire embryo; adnate to testa. Cotyledons smooth; both outer faces convex; both the same thickness; both more or less of equal length; not folded; margin entire 180 degrees from base of radicle; similar at apex; completely concealing radicle; split over radicle; with lobes; with lobes not touching; with the interface division terminating at base of radicle; without margins recessed; tan; inner face flat; glabrous around base of radicle. Embryonic axis right angled; perpendicular to length of seed. Radicle bulbous; lobe tip straight; deflexed and parallel to cotyledon width; centered between cotyledons; 1/2 to nearly length of cotyledons. Plumule rudimentary; glabrous.

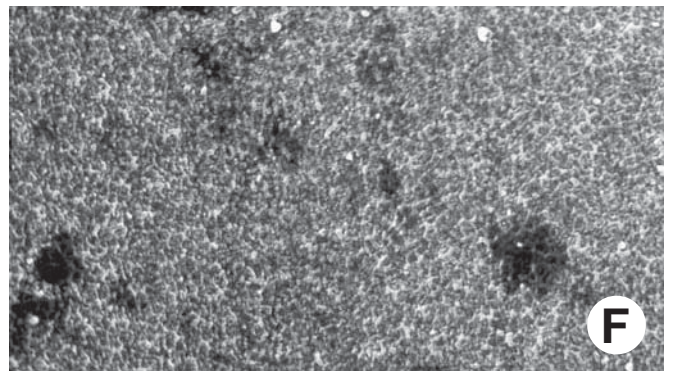
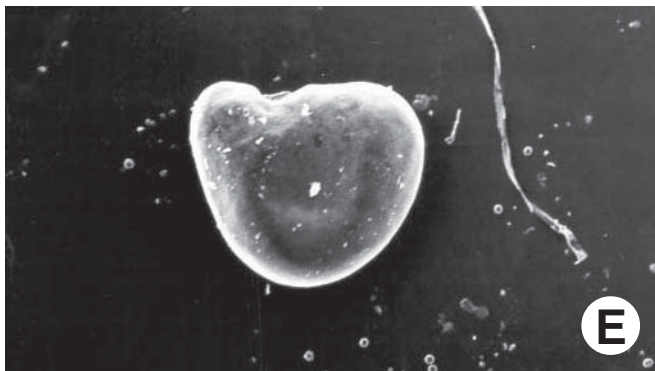
Distribution: Tropical Africa, Indochina, Indonesia (Java), and Australia (Queensland).

Notes: Gillett et al. (1971) have an excellent fruit illustration. Verdcourt (1974) noted that the species is “very local.” Because the fruits are coiled 1.5 times, their lengths, though determined, are of little diagnostic value. Their diameters are noted. This unique dehiscence in the Fabaceae is illustrated in figure B. The fruit breaks into articles that in turn dehisce along their margins.

Cyclocarpa: *C. stellaris* A. Afzelius ex J.G. Baker (A–G). A, Articles and fruit (\times 7.1); B, article with marginal dehiscence (\times 10 and see Notes); C, segment with seed dispersing (\times 13); D, seeds (\times 11); E–F, testa (\times 50, \times 1000); G, embryos (\times 20).



G



Genus: *Discolobium* G. Bentham

Phylogenetic Number: 14.17.

Tribe: Aeschynomeneae.

Subtribe: Discolobiinae.

Species Studied—Species in Genus: 3 spp.—8 spp.

Fruit a legume; unilocular; $2.7\text{--}3.7 \times 0.8\text{--}1.2 \times 0.07\text{--}0.09$ cm; with persistent or deciduous androecial sheath; with deciduous corolla; with persistent calyx; with calyx shorter than fruit; without orifice formed by curving of fruit or fruit segments (because of the upper and lower coils arising from a twisted suture); 1- to 3-coiled (when single coiled, with one major central coil with upper and lower much smaller, sterile coils); not plicate; twisted (top and bottom coils twisted when compared to center coil); symmetrical; circular; not inflated; flattened; without beak; rounded at apex (with persistent long, thick style); apex oblique with longitudinal axis of fruit; rounded at base; right angled with longitudinal axis of fruit; with the apex and base uniform in texture; coriaceous; seed chambers externally invisible. Fruit margin not constricted; without sulcus; embellished; with wing. Fruit wing 1 (per coil); 3–4 mm wide; continuous wing around fruit; on 1 suture. Fruit nonstipitate. Fruit indehiscent. Replum invisible. Epicarp glossy (nearly); monochrome; brown, red (dish), or tan; glabrous or pubescent but soon deciduous; with 1 type of pubescence; puberulent; with pubescence gray; with pubescence uniformly distributed; with simple hairs; pliable; with hair bases plain; eglandular; with spines (short and widely spaced on valves of *D. pulchellum* G. Bentham); not smooth; with elevated features; reticulately veined; tuberculate or not tuberculate; with solid tubercles on each valve; not exfoliating; without cracks. Mesocarp absent. Endocarp dull; monochrome; tan; spongy; nonseptate; chartaceous; not exfoliating; remaining fused to epicarp; entire. Seed 1; length parallel with fruit length. Funiculus less than 0.5 mm long; thick; straight. Aril absent.

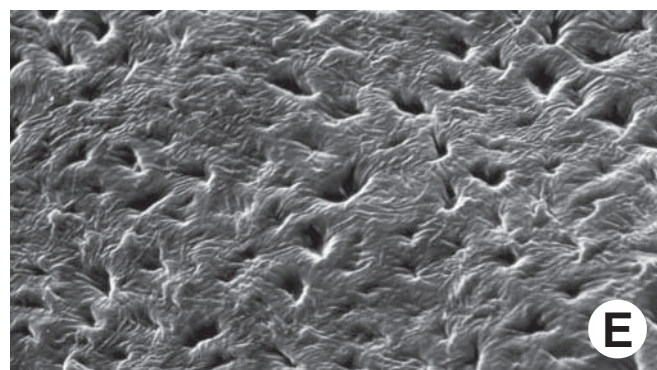
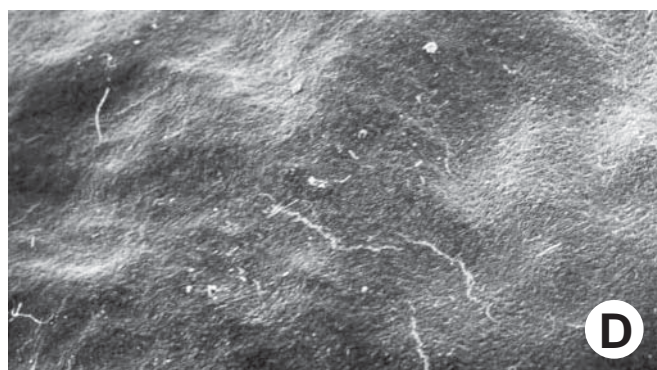
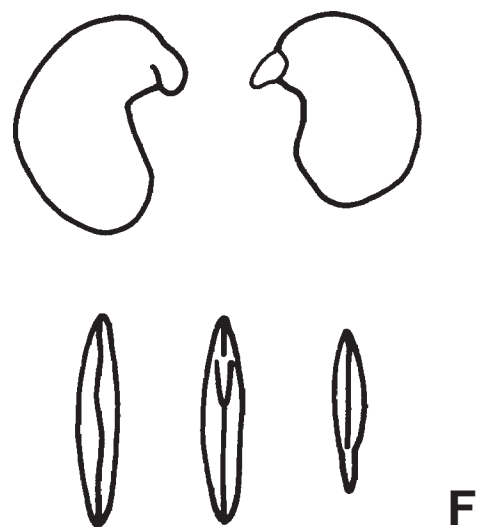
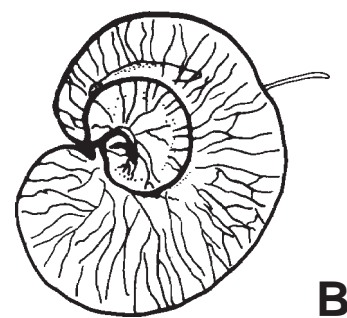
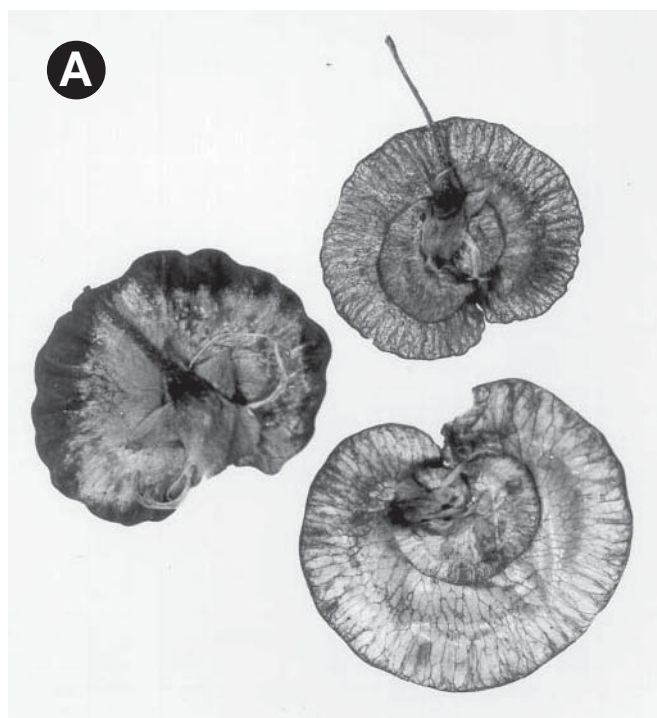
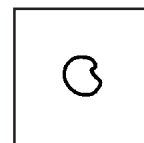
Seed $8 \times 5 \times 0.4$ mm; not overgrown; not angular; asymmetrical; reniform (to lunate); flattened; with visible radicle and cotyledon lobes; without umbo on seed faces. Testa not adhering to endocarp; dull; not modified by a bloom; colored; monochrome; reddish brown; not smooth; with elevated features; wrinkled;

chartaceous. Fracture lines absent. Rim absent. Raphe not visible. Hilum fully concealed; concealed by funiculus; without faboid split; larger than punctiform; 1 mm long; with curved outline; elliptic; marginal according to radicle tip or between cotyledon and radicle lobe; flush; not within corona, halo, or rim. Lens not discernible. Endosperm absent. Cotyledons smooth; both outer faces convex; both the same thickness; both more or less of equal length; not folded; margin entire 180 degrees from base of radicle; similar at apex; not concealing radicle; entire over radicle or notched at radicle; without lobes; with the interface division terminating at base of radicle; without margins recessed; red; inner face flat; glabrous around base of radicle. Embryonic axis deflexed; oblique to length of seed. Radicle bulbous; lobe tip curved; oblique to cotyledons; centered between cotyledons; less than $1/2$ length of cotyledons. Plumule rudimentary; glabrous.

Distribution: Brazil, Paraguay, and Argentina.

Notes: Burkart (1939) monographed the four species in Argentina and provided excellent seed and fruit illustrations of *Discolobium psoraleifolium*. The curiously formed fruit of *Discolobium* are unusual, though not as unique as *Eligmocarpus cynometroides* R. Capuron (Caesalpinioideae: Cassieae) (Gunn 1991). The *Discolobium* fruit is composed of three whorls. The upper and lower whorls are smaller in diameter and sterile, and the middle whorl is larger in diameter and one-seeded (fig. F). This arrangement indicates wind dispersal of the seeds in the indehiscent fruits.

Discolobium: *D. psoraleifolium* G. Bentham (B–F), *D. spp.* (A). A, Fruits ($\times 2.2$); B, fruit diagram showing coiling ($\times 2$); C, seed ($\times 7.3$); D–E, testa ($\times 50$, $\times 1000$); F, embryos ($\times 5$).



Genus: *Amicia* K.S. Kunth

Phylogenetic Number: 14.19.

Tribe: Aeschynomeneae.

Subtribe: Poiretiinae.

Species Studied—Species in Genus: 4 spp.—7 spp.

Fruit a loment; $1-1.5 \times 0.2-0.3 \times 0.05-0.09$ cm; with deciduous corolla; with persistent or deciduous calyx; with calyx shorter than fruit; without orifice formed by curving of fruit or fruit segments; straight; not plicate; not twisted; asymmetrical; when asymmetrical with 1 straight and 1 curved suture; narrowing in several places, resembling *Desmodium* fruit; not inflated; compressed; without beak; rounded at apex; apex aligned with longitudinal axis of fruit; short tapered at base; base aligned with longitudinal axis of fruit; with the apex and base uniform in texture; ligueous; seed chambers externally visible; with the raised seed chambers not torulose. Fruit margin constricted along both margins; with sulcus (margins so thickened to create appearance of a sulcus) or without sulcus; plain or embellished; with prickles or with wings. Fruit wings present or absent; 2; 1 mm wide; valvular; on both valves (and compressed to valves). Fruit nonstipitate. Fruit indehiscent. Replum invisible. Fruit a segment; an intact article; loment segment. Loment indehiscent. Loment segments (articles) inconspicuous; 3–4 mm long; widest across seed area; with all essentially similar in shape; D-shaped. Epicarp dull; monochrome or multicolored; mottled; brown or gray; with black or brown overlay; with mottling over seed chambers; glabrous; eglandular; without spines; not smooth; with elevated features; veined or not veined; reticulately veined; not tuberculate or tuberculate (faintly); not exfoliating; without cracks. Mesocarp absent. Endocarp dull; monochrome; tan; smooth; septate; with septa thicker than paper, firm; with the septa eglandular; chartaceous; not exfoliating; remaining fused to epicarp; entire. Seeds 1–5; length parallel with fruit length; neither overlapping nor touching; in 1 series. Funiculus less than 0.5 mm long; of 1 length only; thick; straight. Aril dry; rim-aril; tan.

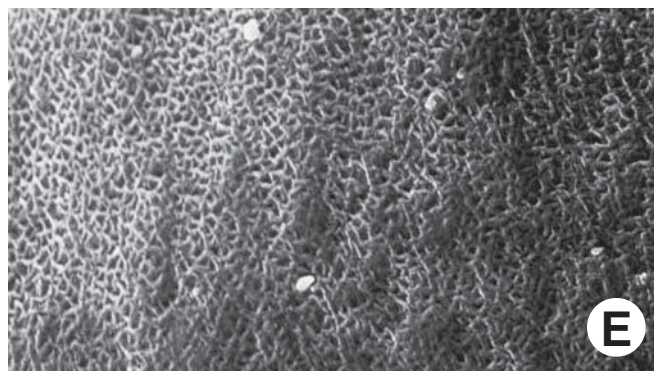
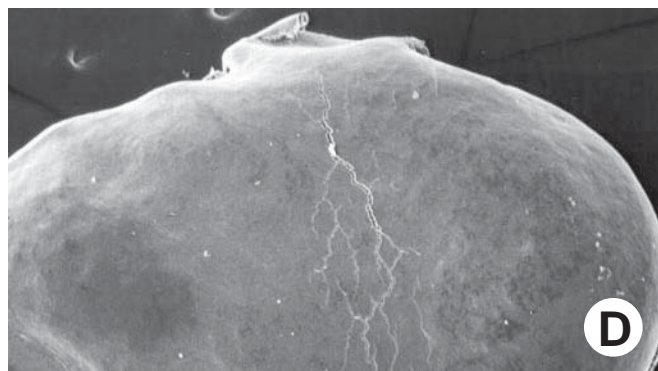
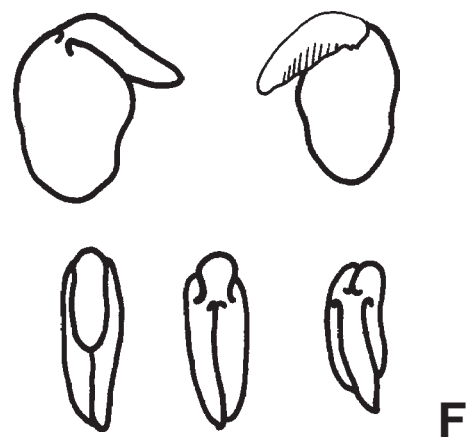
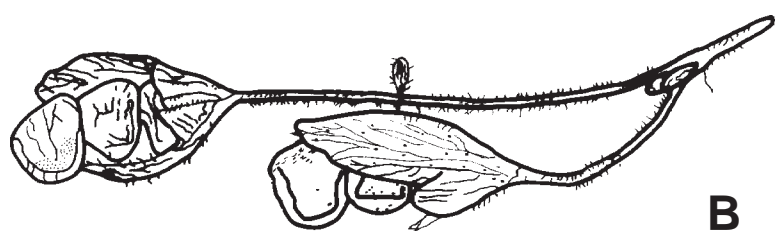
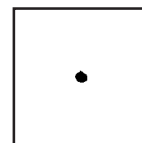
Seed $1.8-3 \times 1.8-3 \times 0.8$ mm; not overgrown; not angular; asymmetrical; mitaform; compressed; with visible radicle and cotyledon lobes; without umbo on seed faces. Testa not adhering to endocarp; dull; not modified by a bloom; colored; monochrome; reddish brown;

glabrous; smooth; chartaceous. Fracture lines absent. Rim absent. Wings absent. Raphe not visible. Hilum visible; without faboid split (perhaps too small to see split); punctiform; between cotyledon and radicle lobe; recessed; not within corona, halo, or rim. Lens not discernible. Endosperm absent. Cotyledons smooth; both outer faces convex; both the same thickness; both more or less of equal length; not folded; margin entire 180 degrees from base of radicle; similar at apex; not concealing radicle; split over radicle; with lobes; with lobes not touching; with the interface division terminating at base of radicle; without margins recessed; red (dish); inner face flat; glabrous around base of radicle. Embryonic axis deflexed; parallel to length of seed. Radicle linear; deflexed and parallel to cotyledon length; centered between cotyledons; $1/2$ to nearly length of cotyledons. Plumule rudimentary; glabrous.

Distribution: Mexico, Ecuador, Peru, Bolivia, and Argentina.

Notes: Burkart (1939) provided a key to the seven species of *Amicia* and described the seeds and fruits of the three species found in Argentina. Our fruit data were somewhat limited and readers should not infer from our plate that the calyx falls with the mature fruit. The relation of the calyx to the mature fruit has not been recorded in the field. The fruits of *A. zygoteris* A.-P. de Candolle are unlike those of other species in the genus. Compare the extreme left article in figure A with the other articles.

Amicia: *A. medicaginea* A.H.R. Grisebach (*B–F*), *A.* spp. (*A*). *A*, Articles and fruit exerted from calyx ($\times 3.1$); *B*, drawing of two fruits ($\times 4$); *C*, seed ($\times 6.8$); *D–E*, testa ($\times 50$, $\times 1000$); *F*, embryos ($\times 15$).



Genus: *Poiretia* E.P. Ventenat

Phylogenetic Number: 14.20.

Tribe: Aeschynomeneae.

Subtribe: Poiretiinae.

Species Studied—Species in Genus: 4 spp.—6 spp.

Fruit a loment; $1.2-4 \times 0.3-0.6 \times 0.5$ cm; with persistent or deciduous corolla; with persistent or deciduous calyx; with calyx shorter than fruit; without orifice formed by curving of fruit or fruit segments; straight to curved (slightly); not plicate; not twisted; asymmetrical or symmetrical; linear to oblong; when asymmetrical with both sutures parallelly curved; not inflated; flattened; without beak; short tapered or rounded at apex; apex aligned with longitudinal axis of fruit; short tapered at base; base aligned with longitudinal axis of fruit; with the apex and base uniform in texture; membranous to coriaceous; seed chambers externally visible; with the raised seed chambers not torulose. Fruit margin constricted along both margins; without sulcus; plain. Fruit wings absent. Fruit nonstipitate. Fruit indehiscent. Replum invisible. Loment indehiscent. Loment segments (articles) inconspicuous; 3–8 mm long; widest across seed area; with all essentially similar in shape; rectangular. Epicarp semiglossy; monochrome; reddish to greenish brown or tan; glabrous; eglandular; without spines; not smooth; with elevated or recessed features; veined or not veined; reticulately veined; not tuberculate; dotted; pitted; not exfoliating; without cracks. Mesocarp absent. Endocarp glossy; monochrome; tan; smooth; septate; with septa thicker than paper, firm; with the septa eglandular; chartaceous; not exfoliating; remaining fused to epicarp; entire. Seeds 1–8; length parallel with fruit length; neither overlapping nor touching; in 1 series. Funiculus less than 0.5 mm long; of 1 length only; flattened; straight. Aril absent.

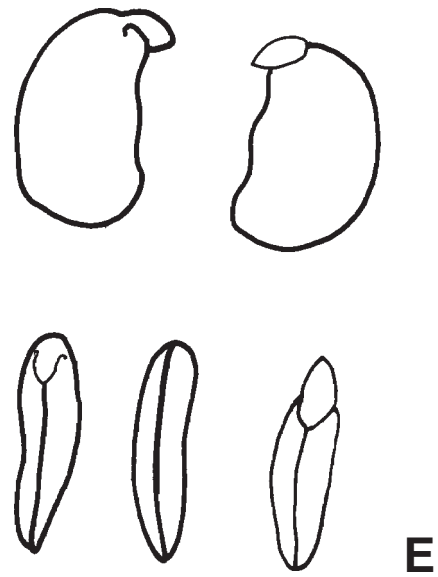
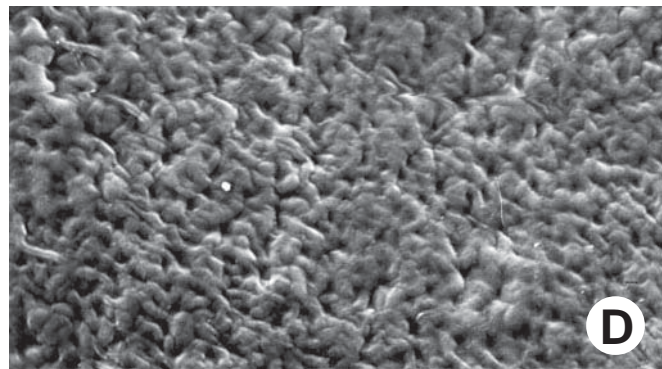
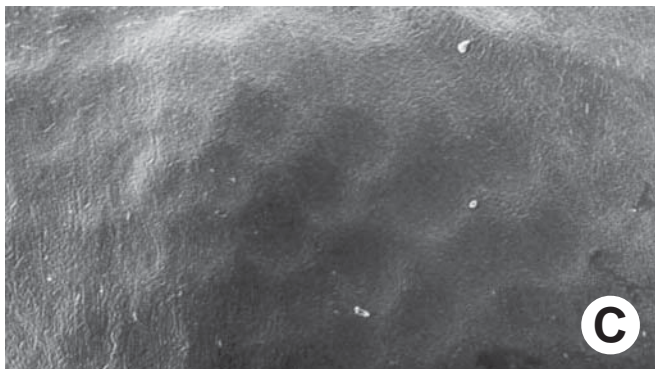
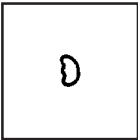
Seed $1.5-3.5 \times 1-2$ mm; not overgrown; not angular; asymmetrical; ovate or reniform; flattened; with visible radicle and cotyledon lobes; without umbo on seed faces. Testa not adhering to endocarp; dull; not modified by a bloom; colored; monochrome; reddish brown; glabrous; not smooth; with recessed features; pitted with small separate pits; coriaceous. Fracture lines absent. Rim absent. Wings absent. Raphe not visible. Hilum partially concealed; concealed by funicular remnant; with faboid split; with the lips of the faboid

split the same color as the rest of the hilum; punctiform; between cotyledon and radicle lobe; flush; within rim. Hilum rim color of testa. Lens discernible; less than 0.5 mm in length; with margins curved; circular; not in groove of raphe; adjacent to hilum; 0.4 mm from hilum; mounded; dissimilar color from testa; darker than testa; black (ish); not within corona, halo, or rim. Endosperm thin; 1/2 covering entire embryo; adnate to testa. Cotyledons smooth; both outer faces convex; both the same thickness; both more or less of equal length; not folded; margin entire 180 degrees from base of radicle; similar at apex; partially concealing radicle; split over radicle; with lobes; with lobes not touching; with the interface division terminating at base of radicle; without margins recessed; yellow; inner face flat; glabrous around base of radicle. Embryonic axis deflexed; oblique to length of seed. Radicle linear; lobe tip straight or curved; deflexed and parallel to cotyledon width; centered between cotyledons; less than 1/2 length of cotyledons. Plumule rudimentary; glabrous.

Distribution: Mexico, Central America, tropical South America.

Notes: Rudd (1972b) summarized the genus and Janke et al. (1988) discussed the pharmacognostic value of *P. latifolia* J.R.T. Vogel and *P. tetraphylla*.

Poiretia: *P. tetraphylla* (J.L.M. Poiret) A.E. Burkart (*C-E*), *P. spp.* (*A-B*). *A*, Fruits and article ($\times 2.2$); *B*, seeds ($\times 6.8$); *C-D*, testa ($\times 50$, $\times 1000$); *E*, embryos ($\times 8$).



Genus: *Zornia* J.F. Gmelin

Phylogenetic Number: 14.21.

Tribe: Aeschynomeneae.

Subtribe: Poiretiinae.

Species Studied—Species in Genus: 77 spp.—ca. 80 spp.

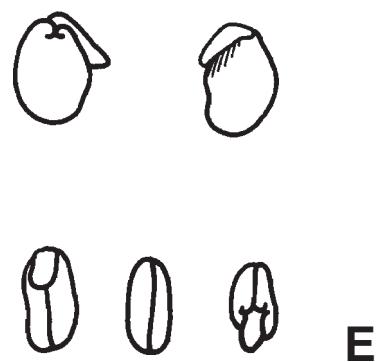
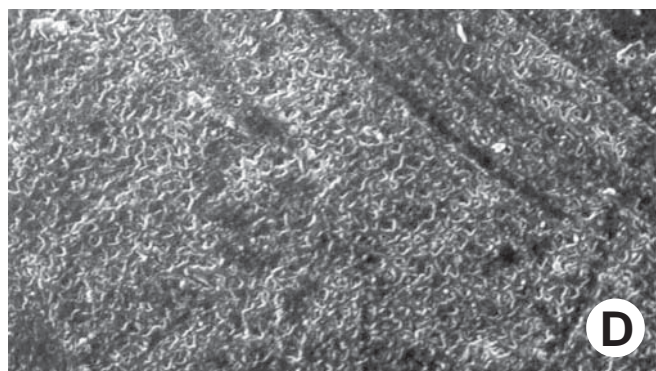
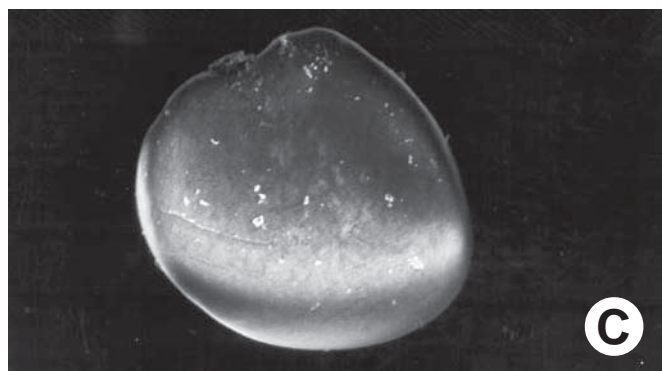
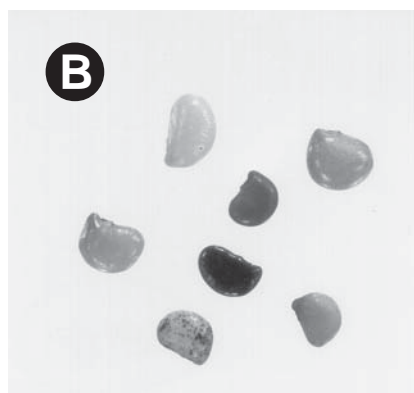
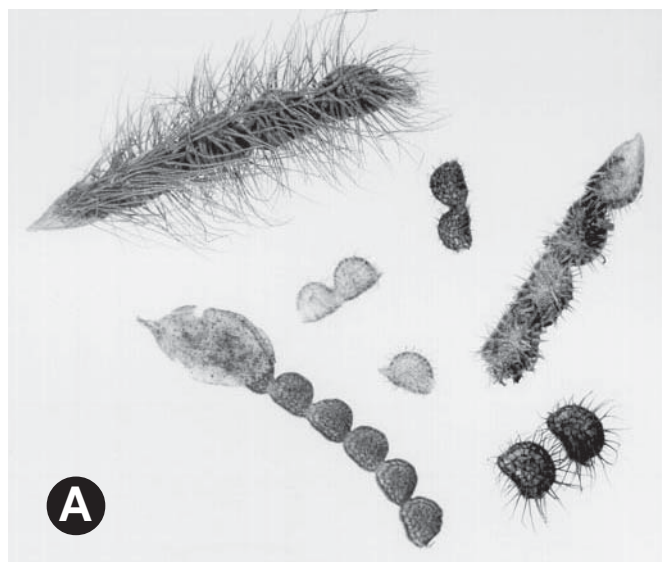
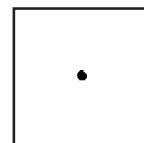
Fruit a loment; $1.1\text{--}1.8 \times 0.1\text{--}0.35 \times 0.1\text{--}0.2$ cm; with deciduous corolla; with persistent calyx; with calyx longer, equal in length to, or shorter than fruit; without orifice formed by curving of fruit or fruit segments; straight to curved (slightly); not plicate; not twisted; asymmetrical or symmetrical; moniliform; when asymmetrical with 1 straight and 1 curved suture or with both sutures parallelly curved; narrowing in several places, resembling *Desmodium* fruit; not inflated; compressed; without beak; rounded at apex; apex aligned with longitudinal axis of fruit; rounded at base; base aligned with longitudinal axis of fruit; with the apex and base uniform in texture; coriaceous; seed chambers externally visible; with the raised seed chambers not torulose. Fruit margin constricted along both margins or constricted only on 1 margin; without sulcus; plain or embellished; with prickles. Fruit wings absent. Fruit nonstipitate. Fruit indehiscent. Replum invisible. Loment indehiscent. Loment segments (articles) inconspicuous; 1.2–5 mm long; widest across seed area; with all essentially similar in shape; circular or D-shaped. Epicarp dull; monochrome (with or without different colored reticulum); brown, green, tan, or yellow; glabrous or pubescent and indurate; with 1 type of pubescence; pilose or villous; with pubescence gray or brown; with pubescence uniformly distributed; with simple or complex hairs; with plumose hairs, bristle-like hairs, or setae; pliable; with hair bases plain; antrorse or retrorse; straight, hooked, or coiled at apex; glandular or eglandular; with glandular dots; without spines; not smooth; with elevated features; veined or not veined; reticulately veined; not tuberculate; glandular dotted; not exfoliating; without cracks. Mesocarp absent. Endocarp dull; monochrome; brown; spongy; septate; with septa thicker than paper, firm; with the septa eglandular; chartaceous; not exfoliating; remaining fused to epicarp; entire. Seeds 1–15; length parallel with fruit length; neither overlapping nor touching; in 1 series. Funiculus less than 0.5 mm long; of 1 length only; thick; straight. Aril absent.

Seed $1.5\text{--}2.3 \times 1\text{--}1.5 \times 0.5\text{--}0.8$ mm; not overgrown; angular or not angular; asymmetrical; elliptic (reniform), irregular (reniform), or reniform (with or without beak); compressed; with visible radicle and cotyledon lobes; without umbo on seed faces. Testa not adhering to endocarp; dull; not modified by a bloom; colored; monochrome or mottled; with frequent or infrequent mottles; brown (to reddish-brown or purplish-brown) or tan; with red overlay; glabrous; smooth; coriaceous. Fracture lines absent. Rim absent. Wings absent. Raphe not visible. Hilum visible; with faboid split; with the lips of the faboid split the same color as the rest of the hilum; punctiform; between cotyledon and radicle lobe; flush; within rim or halo. Hilum halo color lighter than testa. Hilum rim color lighter than testa. Lens discernible or not discernible; less than 0.5 mm in length; with margins curved; 2 circular mounds separated by groove; not in groove of raphe; confluent with hilum (or at least to the hilar rim); mounded; dissimilar color from testa; darker than testa; reddish brown; not within corona, halo, or rim. Endosperm thick or thin; 1/2 covering entire embryo; adnate to testa. Cotyledons smooth; both outer faces convex; both the same thickness; both more or less of equal length; not folded; margin entire 180 degrees from base of radicle; similar at apex; partially concealing radicle; split over radicle; with lobes; with lobes not touching; with the interface division terminating at base of radicle; without margins recessed; yellow; inner face flat; glabrous around base of radicle. Embryonic axis deflexed; oblique to length of seed. Radicle bulbous or linear; lobe tip straight; deflexed and parallel to cotyledon width or oblique to cotyledons; centered between cotyledons; less than 1/2 or 1/2 to nearly length of cotyledons. Plumule rudimentary; glabrous.

Distribution: Tropical and warm temperate regions of Old and New Worlds.

Notes: Mohlenbrock (1961) monographed the genus and revised his monograph in Mohlenbrock (1962a). Reynolds and Holland (1989) corrected and expanded the Mohlenbrock monograph for the 17 species that occur in Australia.

Zornia: *Z. glochidiata* H.G.L. Reichenbach ex A.-P. de Candolle (C–E), *Z. spp.* (A–B). A, Fruits and articles ($\times 2.6$); B, seeds ($\times 5.6$); C–D, testa ($\times 50$, $\times 1000$); E, embryos ($\times 10$).



Genus: *Arthrocarpum* I.B. Balfour

Phylogenetic Number: 14.22.

Tribe: Aeschynomeneae.

Subtribe: Stylosanthinae.

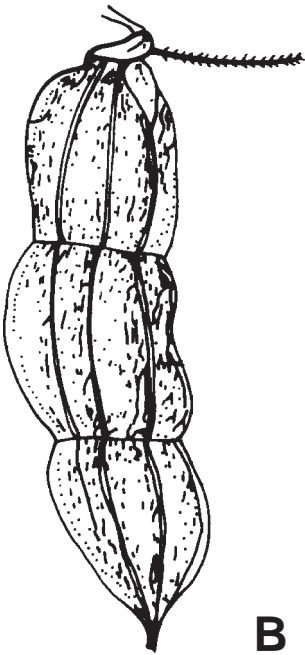
Species Studied—Species in Genus: 1 sp.—2 spp.

Fruit a loment; 2–3 (estimated) \times 0.5–1 (estimated) \times 0.15 cm; with deciduous corolla; with deciduous calyx; without orifice formed by curving of fruit or fruit segments; straight; not plicate; not twisted; asymmetrical; irregular; when asymmetrical with both sutures unequally curved; not inflated; flattened; with beak; with solid beak the same color and texture as fruit; rounded at apex; apex oblique with longitudinal axis of fruit; rounded at base; base oblique with longitudinal axis of fruit; with the apex and base uniform in texture; coriaceous; seed chambers externally invisible. Fruit margin constricted along both margins; with sulcus (broad shallow depression on 1 face); plain. Fruit wings absent. Fruit substipitate. Fruit indehiscent. Replum invisible. Loment indehiscent. Loment segments (articles) inconspicuous; 1.8–2 mm long; widest across seed area; with all essentially similar in shape; oblong. Epicarp dull; monochrome; brown; pubescent and indurate; with 1 type of pubescence; puberulent; with pubescence golden; with simple hairs; pliable; with hair bases plain; eglandular; without spines; not smooth; with elevated features; longitudinally veined relative to fruit length; not tuberculate; not exfoliating; without cracks (2–3 prominent veins on each valve). Mesocarp present (spongy according to Balfour (1888) who labelled it endocarp). Seeds 1–5.

Distribution: Africa (Somalia and Socotra).

Notes: Gillett (1966b) recognized two species that are rarely collected, *A. gracile* and *A. somalense* J.O.D. Hillcoat & J.B. Gillett. Fruits of the latter species are unknown. Unfortunately, Gillett did not discuss the fruit or seed characters of *A. gracile* of Socotra. Our data presented above are based on two fruit samples and data from the text and illustrations of Balfour (1888). Balfour also noted that *A. gracile* is a “very beautiful tree.” Our fruit data are limited to external characters as well as the Balfour plate. We have no seed data.

Arthrocarpum: *A. gracile* I.M. Balfour (A–B). A, Fruits (\times 4.4); B, fruit drawing (\times 3.5, modified from Polhill and Raven 1981).



Genus: *Pachecoa* P.C. Standley & J.A. Steyermark

Phylogenetic Number: 14.23.

Tribe: Aeschynomeneae.

Subtribe: Stylosanthinae.

Species Studied—Species in Genus: 1 sp.—1 sp.

Fruit a loment; $1.5-3 \times 0.4-0.5 \times 0.3-0.37$ cm; with deciduous corolla; with deciduous calyx; without orifice formed by curving of fruit or fruit segments; straight to curved (slightly); not plicate; not twisted; barely asymmetrical to symmetrical; linear or oblong; when asymmetrical with both sutures parallelly curved; not inflated; terete; without or with beak; straight; with solid beak the same color and texture as fruit; long tapered at apex; apex aligned with longitudinal axis of fruit; short tapered at base; base aligned with longitudinal axis of fruit; with the apex and base uniform in texture; ligneous; seed chambers externally invisible. Fruit margin not constricted; without sulcus; plain. Fruit wings absent. Fruit nonstipitate. Fruit indehiscent. Replum invisible. Loment indehiscent. Loment segments (articles) conspicuous; 2.5–10 mm long; widest across seed area; with upper or lower 1 different shape than middle ones; oblong or triangular. Epicarp dull; monochrome; dirty brown; glabrate or pubescent but soon deciduous; with 1 type of pubescence; villous; with pubescence uniformly distributed; with simple hairs; pliable; with hair bases plain; without spines; not smooth; with elevated features; longitudinally veined relative to fruit length (8–9 veins) or reticulately veined (interstices); not tuberculate; not exfoliating; without cracks. Mesocarp thick; surface not veined; 1-layered; without balsamic vesicles; without fibers; solid; ligneous (sub). Endocarp dull; monochrome; tan; smooth; septate; with septa thicker than paper, firm; with the septa eglandular; ligneous (sub); not exfoliating; remaining fused to epicarp; entire. Seeds 2–4; length oblique to fruit length; neither overlapping nor touching; in 1 series. Funiculus less than 0.5 mm long; of 1 length only; filiform; straight. Aril dry; rim-aril; tan.

Seed $3-3.5 \times 2.3-2.5 \times 0.9-1$ mm; not overgrown; not angular; asymmetrical; rhombic; compressed; without visible radicle and cotyledon lobes; without umbo on seed faces. Testa not adhering to endocarp; glossy; not modified by a bloom; colored; monochrome; tan; glabrous; smooth; coriaceous. Fracture lines absent.

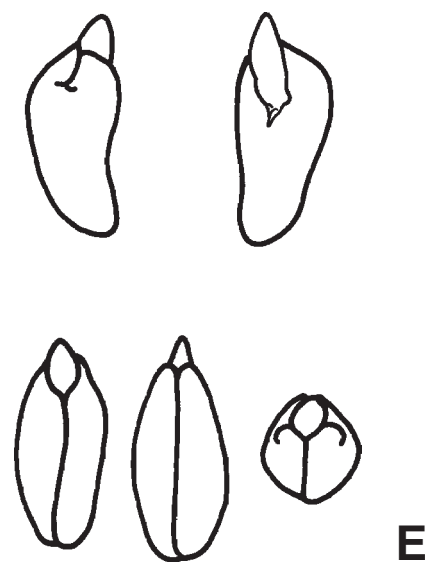
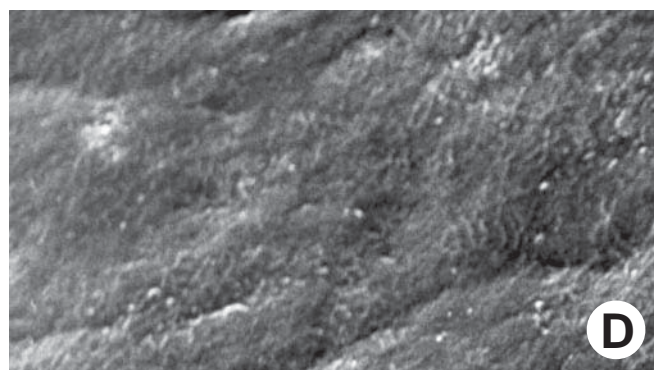
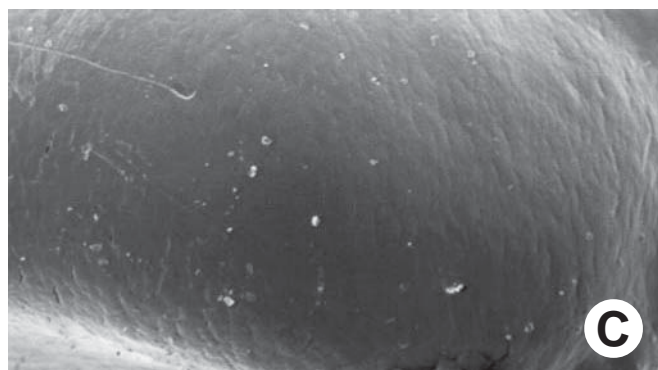
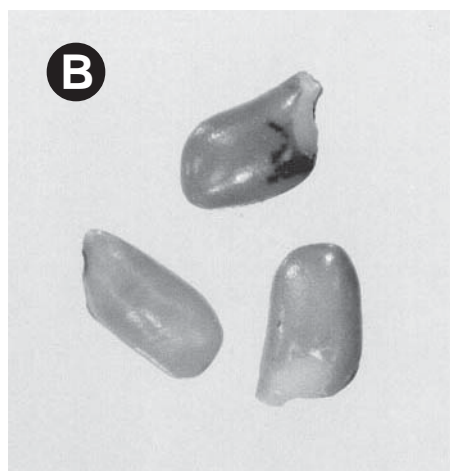
Rim absent. Raphe from hilum through lens to base of seed and terminating; not bifurcating; darker than testa; brown; flush. Hilum visible; with faboid split; with the lips of the faboid split the same color as the rest of the hilum; punctiform; subapical to radicle tip; flush; within halo. Hilum halo color of or darker than testa. Lens discernible; less than 0.5 mm in length; with margins straight; wedge-shaped; not in groove of raphe; adjacent to hilum; mounded; dissimilar color from testa; darker than testa; dark brown; not within corona, halo, or rim. Endosperm absent. Cotyledons smooth; both outer faces convex; both the same thickness; both more or less of equal length; not folded; margin entire 180 degrees from base of radicle; similar at apex; partially concealing radicle; split over radicle; with lobes; with lobes overlapping; with the interface division terminating at base of radicle; without margins recessed; inner face flat; glabrous around base of radicle. Embryonic axis oblique; oblique to length of seed. Radicle linear; lobe tip straight; oblique to cotyledons; centered between cotyledons; less than 1/2 length of cotyledons. Plumule moderately developed; glabrous.

Distribution: Mexico and Guatemala; introduced in Venezuela.

Notes: Norman and Gunn (1985) monographed *Pachecoa*.

Pachecoa: *P. prismatica* (M. Sessé y Lacasta & J.M. Mociño) P.C. Standley & B.G. Schubert (A–B); *P. venezuelensis* A. Burkart (C–E). A, Articles and fruits ($\times 2$); B, seeds ($\times 7.3$); C–D, testa ($\times 50$, $\times 1000$); E, embryos ($\times 6$).

0



Genus: *Chapmannia* J. Torrey & A. Gray

Phylogenetic Number: 14.24.

Tribe: Aeschynomeneae.

Subtribe: Stylosanthinae.

Species Studied—Species in Genus: 1 sp.—1 sp.

Fruit a loment; $1-3 \times 0.25-0.3 \times 0.25-0.3$ cm; with deciduous corolla; with deciduous calyx; without orifice formed by curving of fruit or fruit segments; straight; not plicate; not twisted; asymmetrical; more or less linear; when asymmetrical with 1 straight and 1 curved suture or both sutures parallelly curved; widest near middle or D-shaped (more or less); not inflated; terete; without or with beak; straight; with solid beak the same color and texture as fruit; long tapered at apex; apex aligned with longitudinal axis of fruit; rounded at base; base aligned with longitudinal axis of fruit; with the apex and base uniform in texture; coriaceous; seed chambers externally visible; with the raised seed chambers not torulose. Fruit margin constricted along both margins; without sulcus; plain. Fruit wings absent. Fruit nonstipitate. Fruit indehiscent. Replum invisible. Loment indehiscent. Loment segments (articles) conspicuous; 5–8 mm long; widest across seed area; with upper or lower 1 different shape than middle ones; more or less oblong. Epicarp dull; monochrome; pubescent but soon deciduous; with 1 type of pubescence; villous; with pubescence red (dish-brown and turning brown at maturity) or brown; with pubescence uniformly distributed; with simple hairs and with glandular hairs; pliable; with hair bases plain; glandular; with glandular hairs (reddish, turning brown on maturation); not smooth; with elevated features; longitudinally veined relative to fruit length; not tuberculate; not exfoliating; without cracks. Mesocarp thick; surface not veined; 1-layered; without balsamic vesicles; without fibers; solid; coriaceous. Endocarp glossy; monochrome; white (ish); smooth; septate; with septa thicker than paper, firm; with the septa eglandular; chartaceous; not exfoliating; remaining fused to epicarp; entire. Seeds 1–4; length parallel with fruit length; neither overlapping nor touching; in 1 series. Funiculus less than 0.5 mm long; of 1 length only; thick; straight. Aril absent.

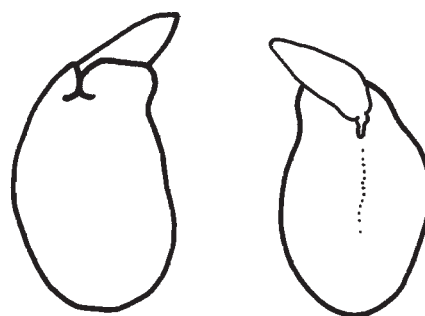
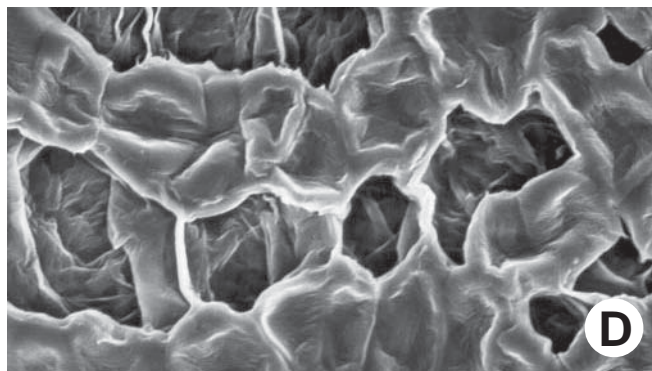
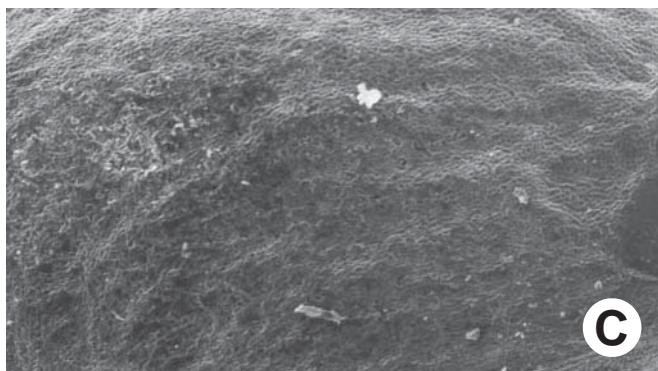
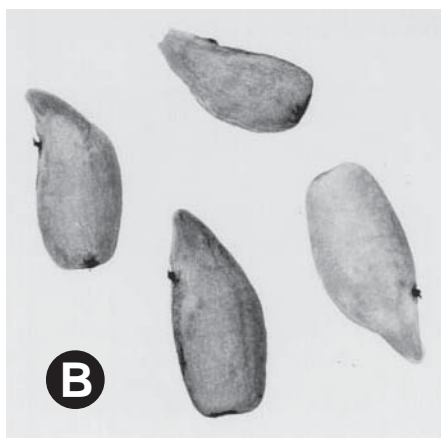
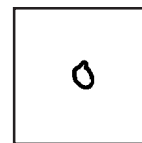
Seed $3.5-4 \times 2-2.5 \times 2$ mm; not overgrown; not angular; asymmetrical; oblong (with radicle end tapered); terete; with visible radicle and cotyledon lobes; without umbo

on seed faces. Testa not adhering to endocarp; nearly glossy; not modified by a bloom; colored; monochrome; yellow; glabrous; not smooth; with elevated features; wrinkled; chartaceous. Fracture lines absent. Rim absent. Wings absent. Raphe from hilum to near base of seed and terminating; not bifurcating; color of testa; raised. Hilum fully concealed; concealed by funicular remnant; without faboid split; punctiform; between cotyledon and radicle lobe; flush; not within corona, halo, or rim. Lens not discernible. Endosperm absent. Cotyledons smooth; both outer faces convex; both the same thickness; both more or less of equal length; not folded; margin entire 180 degrees from base of radicle; similar at apex; completely concealing radicle (nearly); split over radicle; with lobes; with lobes touching (auriculate); with the interface division terminating at base of radicle; tan; inner face flat; glabrous around base of radicle. Embryonic axis oblique; oblique to length of seed. Radicle nearly bulbous; lobe tip curved; oblique to cotyledons; centered between cotyledons; less than 1/2 length of cotyledons. Plumule moderately developed; glabrous.

Distribution: United States (Florida).

Notes: Gunn et al. (1980) monographed the genus.

Chapmannia: *C. floridana* J. Torrey & A. Gray (A–E). A, Articles and incomplete fruits ($\times 2.1$); B, seeds ($\times 6.5$); C–D, testa ($\times 50$, $\times 1000$); E, embryos ($\times 10$).



E

Genus: *Stylosanthes* O.P. Swartz

Phylogenetic Number: 14.25.

Tribe: Aeschynomeneae.

Subtribe: Stylosanthinae.

Species Studied—Species in Genus: 25 spp.—ca. 25 spp.

Fruit a loment; $0.4\text{--}0.9 \times 0.08\text{--}0.25 \times 0.01\text{--}0.02$ cm; with deciduous corolla; with persistent or deciduous calyx; with calyx shorter than fruit; without orifice formed by curving of fruit or fruit segments; straight; not plicate; not twisted; asymmetrical; rectangular (with or without apical beak); when asymmetrical with 1 straight and 1 curved suture or both sutures parallelly curved; widest near middle or D-shaped; not inflated; compressed; with beak; straight, declined, or coiled; with solid beak the same color and texture as fruit; long tapered to tapered to short tapered at apex; apex aligned with longitudinal axis of fruit; short tapered or truncate at base; base aligned with longitudinal axis of fruit; with the apex and base uniform in texture; chartaceous to coriaceous or fragile, thinner than chartaceous like *Trifolium* (23.07); seed chambers externally visible; with the raised seed chambers not torulose. Fruit margin constricted or not constricted; constricted along both margins or constricted on 1 margin and slightly constricted on the other margin; without sulcus; plain. Fruit wings absent. Fruit nonstipitate. Fruit indehiscent. Replum invisible. Loment indehiscent. Loment segments (articles) inconspicuous; 2–4.5 mm long; widest across seed area; with upper 1 different shape than middle one, lower 1 different shape than middle one, or upper 1 different shape than lower 1; D-shaped. Epicarp dull; monochrome; with surface texture uniform or not uniform, with patches of different texture not restricted to the base and apex; glabrous, pubescent and indurate, or pubescent but soon deciduous; with 1 type of pubescence; pilose, puberulent, or villous; with pubescence gray; with pubescence uniformly distributed; with simple hairs; pliable; with hair bases plain; eglandular; without spines; not smooth; with elevated features; longitudinally veined relative to fruit length or reticulately veined (with 2 prominent longitudinal veins); not tuberculate or tuberculate (minutely in *S. guianensis*); not exfoliating; without cracks. Mesocarp absent. Endocarp dull; monochrome; tan; smooth; septate; with septa thicker than paper, firm; with the septa eglandular; coriaceous to chartaceous; not

exfoliating; remaining fused to epicarp; entire. Seeds 1 or 2; length parallel with fruit length; neither overlapping nor touching; in 1 series. Funiculus less than 0.5 mm long; of 1 length only; thick; straight. Aril absent.

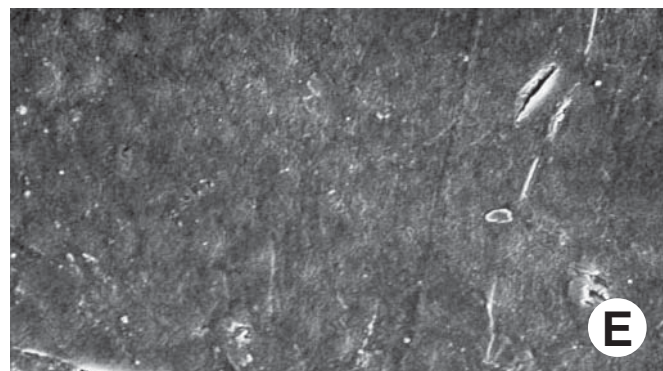
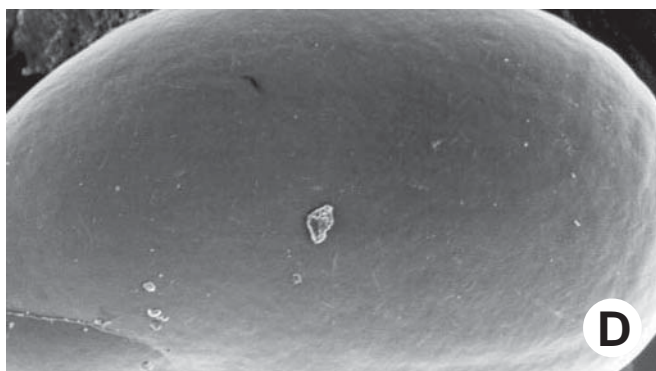
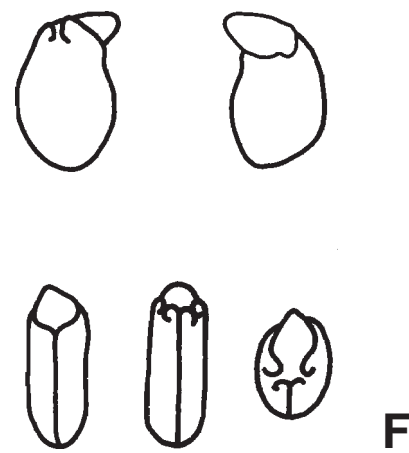
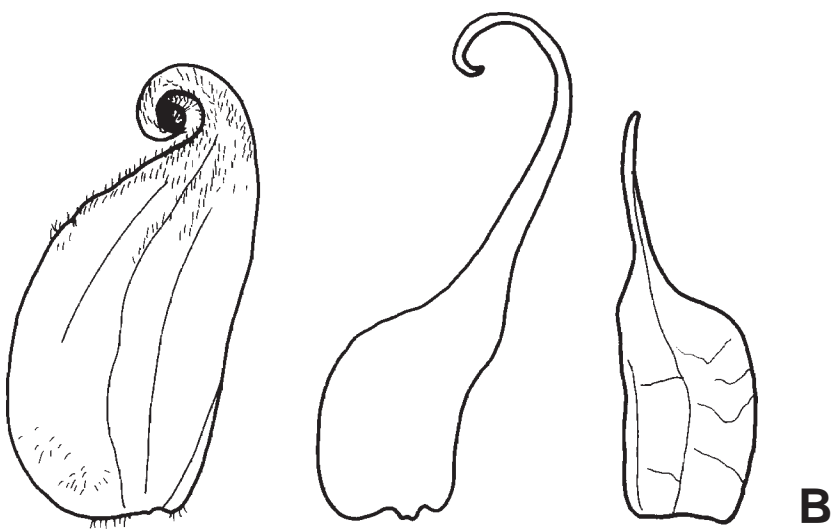
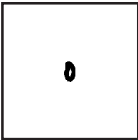
Seed $1.9\text{--}3 \times 1.4\text{--}2.5 \times 0.6\text{--}1.2$ mm; not overgrown; not angular; asymmetrical; ovate or reniform (with prominent radicle lobe (beaklike)); compressed; with visible radicle and cotyledon lobes; without umbo on seed faces. Testa not adhering to endocarp; glossy; not modified by a bloom; colored; monochrome; black, brown (to reddish-brown), or tan; smooth; chartaceous. Fracture lines absent. Rim absent. Wings absent. Raphe not visible. Hilum visible; with faboid split; with the lips of the faboid split the same color as the rest of the hilum; punctiform; between cotyledon and radicle lobe; flush; not within corona, halo, or rim. Lens discernible; less than 0.5 mm in length; with margins curved; circular; not in groove of raphe; adjacent to hilum; 0.5 mm from hilum; mounded; dissimilar color from testa; darker than testa; black; not within corona, halo, or rim. Endosperm present or absent; thin; 1/2 covering entire embryo; adnate to testa. Cotyledons smooth; both outer faces convex; both the same thickness; both more or less of equal length; not folded; margin not entire 180 degrees from base of radicle; similar at apex; partially concealing radicle; split over radicle; with lobes; with lobes not touching; with the interface division terminating at base of radicle; without margins recessed; yellow; inner face flat; glabrous around base of radicle. Embryonic axis deflexed; oblique to length of seed. Radicle bulbous; lobe tip curved; deflexed and parallel to cotyledon width; centered between cotyledons; less than 1/2 length of cotyledons. Plumule rudimentary; glabrous.

Distribution: United States, West Indies, Mexico, Central America, South America (to northern Argentina and Galapagos Islands), central and southern Africa, Madagascar, southern India, Sri Lanka, and adventive in Indonesia to Australia.

Notes: Mohlenbrock (1957) revised *Stylosanthes* and amended his revision (Mohlenbrock 1963). Kirkbride and Kirkbride (1987) established the correct names for the two sections in the genus, and our studied species were obtained nearly equally from both sections. Mohlenbrock (1963) provided a key and fruit illustrations of the 30 species that he recognized. Mohlenbrock (1957) noted that the lower (of two) articles is usually densely pilose to glabrescent and aborted to fertile while the upper article is glabrous or puberulent to

sericeous to minutely tuberculate. The relative beak-upper article lengths are diagnostic. T'Mannetje (1984) reported on the species of this genus and has excellent fruit drawings. Burkart (1952) and Sousa Costa and Ferreira (1984) contain excellent fruit and seed drawings. Reis and Martins (1989a,b) presented interesting data on seed germination of apical and basal section seeds and on the distributional potential of the upper one-half of the legume versus the lower one-half of the legume. Some species of *Stylosanthes* have agronomic potential, especially in Australia and South America (Stace and Edye 1984).

Stylosanthes: *S. guianensis* (J.B.C.F. Aublet) O.P. Swartz
(*D–F*), *S. spp.* (*A–C*). *A*, Articles ($\times 4.7$); *B*, fruit beaks
(coiled, hooked, and straight) ($\times 10$); *C*, seeds ($\times 6.8$);
D–E, testa ($\times 50$, $\times 1000$); *F*, embryos ($\times 8$).



Genus: *Arachis* C. Linnaeus

Phylogenetic Number: 14.26.

Tribe: Aeschynomeneae.

Subtribe: Stylosanthinae.

Species Studied—Species in Genus: 18 spp.—71 spp.

Fruit a legume; unilocular; $0.8\text{--}6 \times 0.5\text{--}2.1 \times 0.5\text{--}2.1$ cm; with deciduous corolla; with deciduous calyx; without orifice formed by curving of fruit or fruit segments; straight; not plicate; not twisted; asymmetrical or symmetrical; oblong, ovate, or irregular; when asymmetrical with both sutures unequally curved; not inflated; terete; without beak; rounded at apex; apex oblique or right-angled with longitudinal axis of fruit; rounded at base; base oblique with longitudinal axis of fruit; with the apex and base uniform in texture; coriaceous; seed chambers externally visible or invisible; with the raised seed chambers not torulose. Fruit margin constricted or not constricted; constricted along both margins; without sulcus; plain. Fruit nonstipitate. Fruit indehiscent. Replum invisible. Epicarp dull; monochrome; tan; glabrous; eglandular; without spines; not smooth; with elevated features; reticulately veined; not tuberculate; not exfoliating; without cracks. Mesocarp thick; surface uniformly veined; 1-layered; without balsamic vesicles; without fibers; firm-walled open empty cells; coriaceous. Endocarp dull; monochrome; white; cobwebby or scurfy; nonseptate; chartaceous; not exfoliating; remaining fused to epicarp; entire. Seeds 1–3; length parallel with fruit length; touching; in 1 series. Funiculus less than 0.5 mm long; of 1 length only; thick; straight. Aril absent.

Seed $7\text{--}25 \times 4\text{--}15 \times 4\text{--}15$ mm; overgrown, 1 seed filling entire fruit cavity or not overgrown; angular or not angular; asymmetrical; elliptic, oblong, or ovate; terete; with visible radicle and cotyledon lobes; without umbo on seed faces. Testa not adhering to endocarp; dull; not modified by a bloom; colored; monochrome or bichrome (reddish-brown and white); reddish brown or white; glabrous; smooth or not smooth; with elevated features; veined; chartaceous. Fracture lines absent. Rim absent. Raphe not visible. Hilum fully concealed; concealed by funicular remnant; without faboid split; larger than punctiform; 2 mm long; with curved outline; elliptic; subapical to radicle tip; flush; not within corona, halo, or rim. Lens not discernible. Endosperm

absent or present (according to Kubicek (1970) and see Notes); trace; $1/2$ covering entire embryo; adnate to testa. Cotyledons smooth; both outer faces convex; both the same thickness; both more or less of equal length; not folded; margin entire 180 degrees from base of radicle; similar at apex; partially concealing radicle; split over radicle; with lobes; with lobes not touching; with the interface division terminating at base of radicle; without margins recessed; tan; inner face flat; glabrous around base of radicle. Embryonic axis straight; parallel to length of seed. Radicle bulbous; lobe tip straight or curved; straight with embryonic axis; centered between cotyledons; less than $1/2$ length of cotyledons. Plumule well developed; glabrous.

Distribution: Eastern South America; introduced and cultivated elsewhere.

Notes: Hoehne (1940) and Hermann (1954) monographed the genus, and Ressler (1980) reviewed the nomenclature. Rudd (1981a) used the same number of recognized species as Ressler, and both noted that possibly 40 (Rudd) to 70 (Ressler) species were undescribed. Wynne and Halward (1989) recognized 33 species, including several *nomum nuda* species names. Krapovickas and Gregory (1994) monographed *Arachis* and recognized 69 species in the genus. Several new species of *Arachis* have been discovered since publication of Krapovickas and Gregory's monograph (José F.M. Valls, personal communication, 1994). Kubicek (1970) stated that "contrary to reports by other investigators the endosperm appeared to be present as a single layer which covers the cotyledons in mature seeds." Gregory and Gregory (1979) studied interspecific hybrids. Bentham (1841) compared the structures and affinities of *Arachis* and *Voandzeia* (now *Vigna* 10.65). Charles F. Simpson, USDA/ARS, made a major contribution of seeds and fruits to the U.S. National Seed Herbarium (BARC).

Arachis: *A. hypogaea* C. Linnaeus (C–E), *A. spp.* (A–B). A, Fruits and valve ($\times 1.1$); B, seeds ($\times 2$); C–D, testa ($\times 50$, $\times 1000$); E, embryos ($\times 2.5$).

